



NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

**THE CHINA-INDIA-PAKISTAN WATER CRISIS: PROSPECTS
FOR INTERSTATE CONFLICT**

by

James F. Brennan

September 2008

Thesis Co-Advisors:

Alice Lyman Miller
Feroz Khan

Approved for public release, distribution is unlimited

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE			<i>Form Approved OMB No. 0704-0188</i>	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE September 2008	3. REPORT TYPE AND DATES COVERED Master's Thesis	
4. TITLE AND SUBTITLE: The China-India-Pakistan Water Crisis: Prospects for Interstate Conflict			5. FUNDING NUMBERS	
6. AUTHOR(S) James F. Brennan, Lieutenant, United States Navy				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release: distribution is unlimited			12b. DISTRIBUTION CODE	
13. ABSTRACT (maximum 200 words) This thesis examines the prospects of conflict caused by water scarcity in China, India, and Pakistan. The thesis uses indicators of water tensions including: water quality, water quantity, the management of water, state institutions and national water philosophy. On its own, water shortage will unlikely be the only cause of regional conflict; however, the resource may be one catalyst of conflict or instability in the already fragile region. The indicators studied throughout this thesis continue to deteriorate and are anticipated to reach unacceptable levels by the year 2025. The current water dilemma in Asia increases the likelihood for regional conflict if practical solutions are not obtained.				
14. SUBJECT TERMS China, India, Pakistan, Water, Crisis, Interstate Conflict			15. NUMBER OF PAGES 73	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UU	

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. Z39-18

THIS PAGE INTENTIONALLY LEFT BLANK

Approved for public release, distribution is unlimited

**THE CHINA-INDIA-PAKISTAN WATER CRISIS: PROSPECTS FOR
INTERSTATE CONFLICT**

James F. Brennan
Lieutenant, United States Navy
B.A., Wabash College, 1997

Submitted in partial fulfillment of the
requirements for the degree of

**MASTER OF ARTS IN SECURITY STUDIES
(FAR EAST, SOUTHEAST ASIA, PACIFIC)**

from the

**NAVAL POSTGRADUATE SCHOOL
September 2008**

Author: James F. Brennan

Approved by: Alice Lyman Miller
Thesis Co-Advisor

Feroz Khan
Thesis Co-Advisor

Harold A. Trinkunas
Chairman, Department of National Security Studies

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

This thesis examines the prospects of conflict caused by water scarcity in China, India, and Pakistan. The thesis uses indicators of water tensions including: water quality, water quantity, the management of water, state institutions and national water philosophy. On its own, water shortage will unlikely be the only cause of regional conflict; however, the resource may be one catalyst of conflict or instability in the already fragile region. The indicators studied throughout this thesis continue to deteriorate and are anticipated to reach unacceptable levels by the year 2025. The current water dilemma in Asia increases the likelihood for regional conflict if practical solutions are not obtained.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

I.	INTRODUCTION.....	1
A.	PURPOSE.....	1
B.	IMPORTANCE.....	1
C.	LITERATURE REVIEW	3
1.	Global Water Shortages: The Reality	3
2.	Asian Water Conflict: The Sino-South Asian Aspect.....	7
3.	Conflict Over Water: An Historical Perspective	7
4.	Debates on Water Wars.....	8
D.	MAJOR QUESTIONS AND ARGUMENTS.....	10
E.	METHODOLOGY AND SOURCES.....	11
1.	Methodology	11
2.	Sources	12
3.	Thesis Outline.....	12
II.	CHINA’S WATER CRISIS: THE PROBLEM, CAUSES AND POSSIBLE SOLUTIONS	13
A.	INTRODUCTION.....	13
B.	SOURCES OF CHINA’S WATER	14
1.	Glaciers	14
2.	Surface Water.....	15
3.	Ground Water	18
C.	CHINA’S WATER RESOURCES: EXAMINING ITS PRIMARY USERS.....	18
1.	Domestic Use.....	19
2.	Agricultural Use	20
3.	Industrial Use	20
D.	THE ROAD TO CRISIS: FACTORS CONTRIBUTING TO CHINA’S IMMINENT WATER EMERGENCY	21
1.	Inefficient Use.....	22
2.	Pollution	23
E.	GOOD INTENTIONS, BAD EXECUTION: BEIJING’S EFFORTS TO MITIGATE THIS CRISIS	24
1.	Beijing’s “Top-Down Approach” – The 1988 Water Law	25
2.	2002 Water Law Revision	26
3.	Colossal Water Diversion Projects: Beijing’s Near-Term Solution	28
F.	CHINESE WATER SCARCITY: THE CONSEQUENCES.....	29
1.	Are Beijing’s Policies Killing China’s People?.....	30
2.	Economic Regression	30
3.	Interstate Conflict	31
G.	CONCLUSION	31

III.	THE SOUTH ASIAN WATER CRISIS: THE PROBLEM, CAUSES AND POSSIBLE SOLUTIONS.....	35
A.	INTRODUCTION.....	35
B.	THE ORIGIN OF CONFLICT: THE PARTITION OF INDIA AND PAKISTAN.....	36
C.	1948: THE REASON FOR THE INDUS WATER TREATY	38
D.	1960 INDUS WATER TREATY	39
E.	NUCLEAR NATIONS.....	40
F.	CONTEMPORARY CHALLENGES: IS THE TREATY STILL RELEVANT?	42
G.	CONCLUSION	44
IV.	RECOMMENDATIONS AND CONCLUSION.....	47
A.	SUMMARIZING THE ISSUES	47
B.	ASIAN FOREIGN POLICY: WHAT DOES THE U.S. HAVE TO LOSE?	48
C.	PRESERVING NATURAL RESOURCES: ARE WE SET UP TO SUCCEED?	50
D.	FINAL ANALYSIS.....	51
	LIST OF REFERENCES.....	53
	INITIAL DISTRIBUTION LIST	59

LIST OF FIGURES

Figure 1.	The Tibetan Plateau.	3
Figure 2.	Projected Water Scarcity in 2025.	4
Figure 3.	Water Availability in China, India and Pakistan.	6
Figure 4.	Methodology.	11
Figure 5.	China's Water Dilemma.	13
Figure 6.	The Tibetan Plateau and China's Major Rivers.....	15
Figure 7.	China's Three Gorges Dam.	17
Figure 8.	The South to North Water Diversion Project.....	28
Figure 9.	The Wullar Barrage Project.	42
Figure 10.	The I-P-I Pipeline.....	44

THIS PAGE INTENTIONALLY LEFT BLANK

ACKNOWLEDGMENTS

Without my wife's support, my life would not be where it is today. Sarah, I want to thank you for your support during the long hours, deployments, and the endless moving. Additionally, I want to thank you for ensuring our family is well taken care of on a daily basis.

Thanks to my mom for instilling the importance of education in my life. Without her support and guidance, I would not have made it this far in my educational journey.

THIS PAGE INTENTIONALLY LEFT BLANK

I. INTRODUCTION

A. PURPOSE

This thesis examines how China's growing water requirements may affect Beijing's relations with South Asia. China's shrinking water resources may lead Beijing to build dams and take other actions on the Tibetan Plateau in order to address this growing concern.¹ The Tibetan Plateau serves as an untapped resource for China and is the origin of many neighboring countries essential water supplies. More specifically, the Tibetan Plateau is the origin of India and Pakistan's great rivers – the Indus, Ganges, and Brahmaputra. The decision to focus on the Tibetan Plateau as a solution to China's water crisis will likely will affect the Brahmaputra River, essential to India. Additionally, although less likely due to geographical challenges, Beijing's decision to dam Tibetan rivers could also impact the Indus and Ganges River, essential to India and Pakistan. The ongoing tension between India and Pakistan over critical water resources in the Kashmir region sets the stage for increased regional tension if Beijing moves forward with its proposed plans. The consequences of such actions could include a degradation of recently improved relations among these countries, and even to armed conflict.

B. IMPORTANCE

Water scarcity is a serious issue in many countries around the world. Historically, water-related crises originated in the Middle East – occasionally leading to armed conflict

¹ Environment and Development Desk, Department of Information and International Relations, Central Tibetan Administration, Tibet: A Human Development and Environment Report, 2007, Chapter Five, 126-129 <http://www.tibet.net/en/diir/pubs/edi/tib2007/chap-5.pdf> (accessed 2 September 2008); Brahma Chellaney, "China Aims for Bigger Share of South Asia's Water Lifeline," Yale Global Online, <http://yaleglobal.yale.edu/display.article?id=9377> (accessed 2 September 2008); Brahma Chellaney, "Averting Water Wars in Asia The Next Struggle," 27 June 2007: http://www.redorbit.com/news/science/982359/averting_water_wars_in_asia_the_next_struggle/index.html?source=r_science (accessed 2 September 2008); Claude Arpi, "Diverting the Brahmaputra: Declaration of War?", <http://www.rediff.com/news/2003/oct/27spec.htm> (accessed 2 September 2008); Keith Schneider and C. T. Pope, "China, Tibet, and the Strategic Power of Water," <http://www.circleofblue.org/waternews/world/china-tibet-and-the-strategic-power-of-water/> (accessed 2 September 2008).

over the resource. Recently, however, Asia has increasingly faced a steady reduction in fresh water availability.² These water dilemmas, in conjunction with ineffective policies concerning shared resources, may set in motion a chain of events resulting in future armed conflict between China, India, and Pakistan.

In order to prevent a potential disaster, it is important to identify the problem at hand. China, India, and Pakistan are all reliant on shared water supplies originating in the Tibetan Plateau (see Figure 1).³ For China, the Tibetan Plateau serves as an unexploited resource that could help to resolve a mounting water crisis. For India and Pakistan, the Tibetan Plateau serves as the starting point for their most important water lifelines – the Brahmaputra, Ganges, and Indus River.⁴ In either case, as water requirements rise for these countries and as resources shrink, it is becoming clear that efforts to tap these resources may foster competition – possibly leading to interstate conflict. Therefore, it is crucial to identify the current status of the availability of water, examine the causes of the shortages, and discuss the proposed solutions that directly affect the possible outcome of this evolving situation.

² Chietigj Bajpae, Power and Interest News Report, "Asia's Coming Water Wars," 22 August 2006: http://www.pinr.com/report.php?ac=view_report&report_id=545&language_id=1 (accessed 25 October 2007); Vandana Shiva, *Water Wars: Privatization, Pollution and Profit* (Cambridge, MA: South End Press, 2002); Brahma Chellaney, "Averting Water Wars in Asia The Next Struggle," 27 June 2007: http://www.redorbit.com/news/science/982359/averting_water_wars_in_asia_the_next_struggle/index.html?source=r_science (accessed 3 October 2007).

³ Yang Qinye and Zheng Du, *Tibetan Geography* (Beijing: China Intercontinental Press, 2004), 62.

⁴ Aloys Arthur Michel, *The Indus River: A Study of the Effects of Partition* (New Haven and London: Yale University Press, 1967).

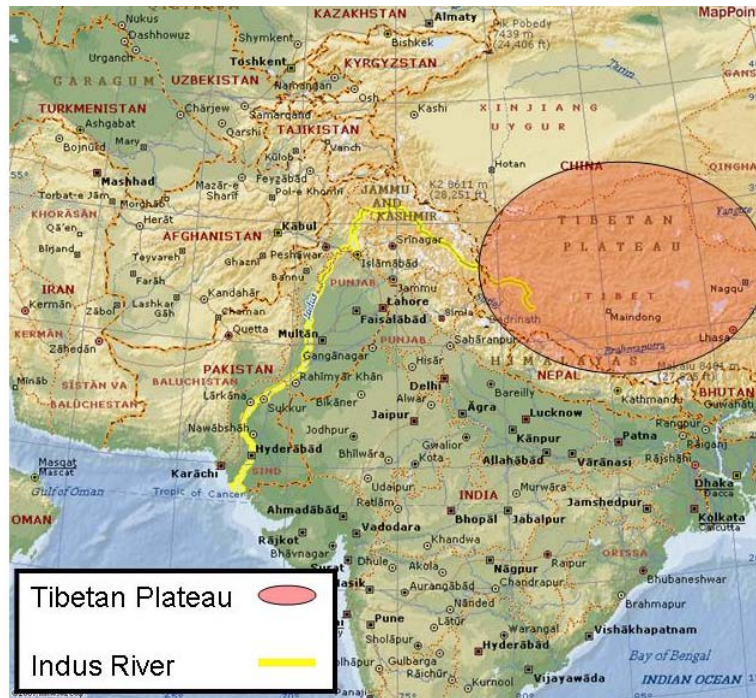


Figure 1. The Tibetan Plateau.

This research will provide insight into the severity of the issue and how these countries are handling it. Additionally, it will explore the pros and cons of proposed solutions that might benefit the parties concerned. In other words, it will assess the extent to which all parties might benefit from a peaceful negotiation regarding these resources – possibly resulting in new or expanded treaties – and the degree to which the parties appear prepared either to accept such negotiated solutions or to seek unilateral advantage in confrontations and conflict.

C. LITERATURE REVIEW

1. Global Water Shortages: The Reality

Few scholars dispute the likelihood of future wars over water. Despite varying theories as to why this resource is dwindling (including global warming, population growth, pollution, and mismanaged resources), the conclusions remain the same – the world's water is becoming scarce, and this scarcity will likely contribute to regional

instability and conflict (see Figure 2).⁵ The issue of global water shortages does not get the attention as other high-profile resources do such as oil, natural gas, diamonds, timber and minerals. The supply of fresh water in many countries is already at a critical point – particularly in China, India, and Pakistan, home to over half of the world’s population. Due to these massive populations, national resource requirements, and ineffective resource-sharing policies, the potential for water wars involving these three countries is significant.⁶

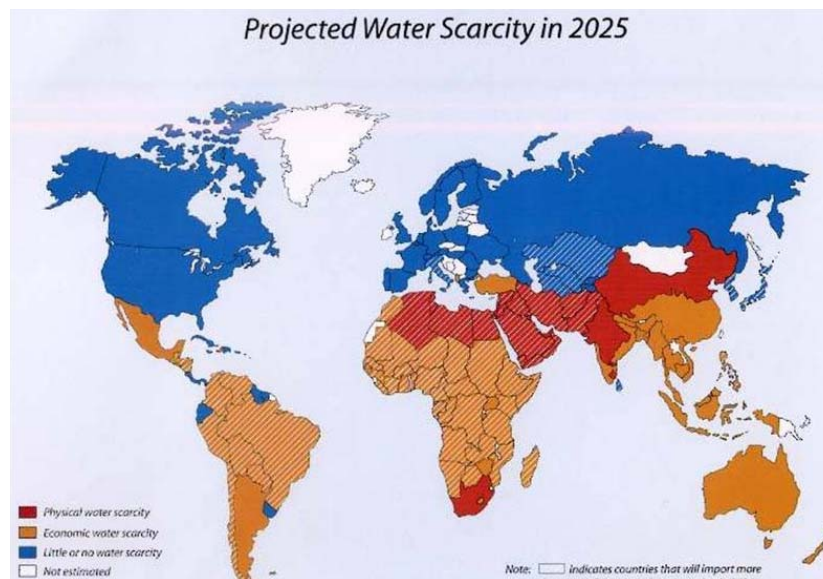


Figure 2. Projected Water Scarcity in 2025.

The International Water Management Institute (IWMI), whose mission is to improve the management of land and water resources for food, livelihood, and nature, has reported that approximately a quarter of the world’s population lives in areas facing “physical water shortages.”⁷ Furthermore, the IWMI assesses that a third of the world’s population is suffering from a shortage of water, raising the prospect of “water crisis” in

⁵ Chietigj Bajpae , ”Asia’s Coming Water Wars;” Vandana Shiva, Water Wars.

⁶ Elizabeth C. Economy, *The River Runs Black: The Environmental Challenge to China’s Future* (Ithaca, NY: Cornell University Press, 2004), 257; Chietigj Bajpae , ”Asia’s Coming Water Wars;” Vandana Shiva, Water Wars.

⁷ International Water Management Institute (IWMI), http://www.iwmi.cgiar.org/assessment/files_new/newsroom/FinancialTimes_World_2006.pdf (accessed 6 September 2007).

countries such as China, India, and Pakistan.⁸ The potential for water conflict is greatest in developing countries that lack effective tools for the proper management of this resource.⁹ In Asia, the many attempts to curtail this problem include the Mekong River Committee (1957) and its successor, the Mekong River Commission, the treaties of Sarada (1920), Kosi (1954), and Gandak (1959) between India and Nepal, the Indus Water Treaty between India and Pakistan (1960), the Ganges Waters Treaty between India and Bangladesh (1977), and the 1998 Agreement on the Use of Water and Energy Resources of the Syr Darya Basin between Kazakhstan and Uzbekistan.¹⁰ A weakness that these agreements share is an overall unwillingness of their signatories to modify them over time, and the lack of enforcement – leaving their effectiveness open to question.

The irony of living on a planet that is over two-thirds water and facing a potential world wide water shortage may seem a difficult concept to grasp. However, it is slowly becoming reality. The facts and figures that underlie this unfortunate truth paint a gloomy picture that clearly sets the stage for an increased likelihood of conflict over water. For example, in 1998, 28 countries reported experiencing water scarcity, and that number is expected to rise to 56 by 2025.¹¹ Additionally, between 1990 and 2025, the projected number of people affected by these limited water supplies will rise from 131 million to 817 million.¹²

The definition of water scarcity has changed over the years. Mathematical researchers provide a quantitative definition as a country in which available water is lower than 1,000 cubic meters per person per year; at this point, the health and economic development of a nation are considered to be vulnerable.¹³ Furthermore, if available

⁸ IWMI; Chietigj Bajpae , "Asia's Coming Water Wars;" Vandana Shiva, Water Wars.

⁹ Chietigj Bajpae , "Asia's Coming Water Wars."

¹⁰ Ibid.

¹¹ Vandana Shiva, Water Wars, 1; Waternunc, <http://www.waternunc.com/gb/pws2025.htm> (accessed 8 September 2007).

¹² Vandana Shiva, Water Wars, 1.

¹³ Ibid.

water drops below 500 cubic meters, people's survival is grievously compromised. Historical comparisons indicate that China, India, and Pakistan's status as water-scarce countries are approaching quickly (see Figure 3). In 1951, India's annual water availability per person was 5,277 cubic meters. In the 1990s, it fell to 2,464 cubic meters. By 2025, it is projected to fall dangerously close to the 1,000 cubic meters level.¹⁴ As for China, its water availability per person was 4,597 in 1950 and 2,427 in the 1990s – slightly above the sufficiency threshold level. However, by 2025, it is assessed that China's water availability will plummet to 1,818 cubic meters – an alarming number for an approximate population of 1.5 billion.¹⁵ Finally, Pakistan's water availability per person in 1950 was an amazing 10,590 cubic meters per person. However, it fell drastically to 3,962 in the 1990s and is projected to level out at 1,803 by 2025.

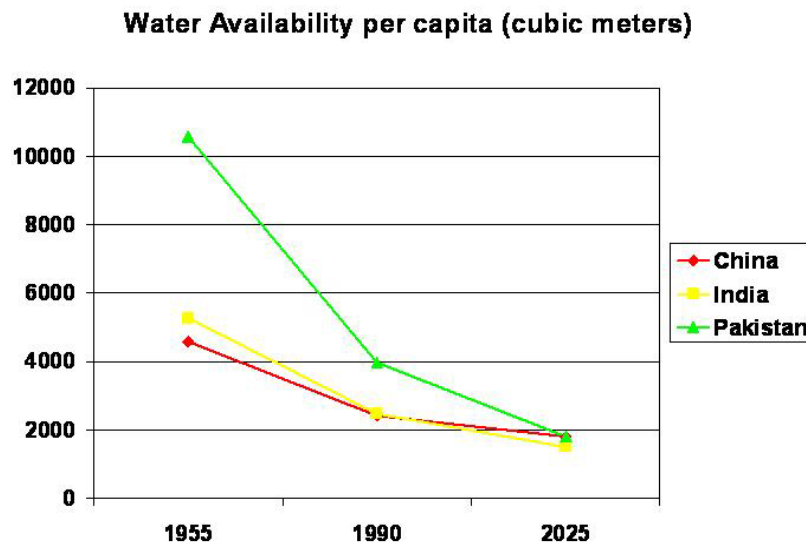


Figure 3. Water Availability in China, India and Pakistan.

In contrast, a qualitative approach to understanding water scarcity focuses on the practical aspect of having limited access to this critical resource. This research method defines water scarcity by identifying a list of distinctive characteristics that must be present in an identified area. They include the need to carry heavy pots of water several

¹⁴ Vandana Shiva, *Water Wars*, 1.

¹⁵ Charles Wolf, Jr., K.C. Yeh, Benjamin Zycher, Nicholas Eberstadt, Sung-Ho Lee, *Fault Lines in China's Economic Terrain*, (Santa Monica, CA: Rand, 2003), 75.

miles every day to meet household needs, poverty caused by farmers losing their land or the landless losing their jobs because of a lack of irrigation water, the loss of wetlands or estuaries because of upstream water depletion, and water pollution giving rise to the incidence of water-borne diseases.¹⁶ The qualitative approach highlights the potential human toll this shortage could affect and the possible motivations behind a decision to go to war over it.

2. Asian Water Conflict: The Sino-South Asian Aspect

Asia's growing economic importance highlights the need to maintain regional stability among all countries. Therefore, the technical definition of water scarcity is as important as what is being done about it. In order to address the problem, it is crucial to acknowledge the growing crisis and identify a solution prior to the outbreak of hostilities. The fact is that the availability of fresh water is dropping and a severe depletion could threaten the survival of a country's people. Since the 1970s, the global per capita water supply has declined by 33 percent.¹⁷ It is at the point of self-preservation that the concern for conflict arises.

In light of the recently improved relations between New Delhi, Islamabad and Beijing, it is important to assess the potential for a peaceful resolution among these countries over this issue. Therefore, it is crucial to examine the historical context behind these tensions, the current players and policies, and the potential impact of regional conflict on relations between these countries.

3. Conflict Over Water: An Historical Perspective

History is rife with accounts of conflict over water. These conflicts range from water being used as a military tool, as an expression of religious beliefs, and as a key factor in developmental disputes. Additionally, these water-related conflicts span the globe, and everyone facing water scarcity is exposed to possible conflict over it. The

¹⁶ IWMI; Alan Dupont, *East Asia Imperiled: Transnational Challenges to Security*, (New York: Cambridge University Press, 2001), 120-121.

¹⁷ Vandana Shiva, *Water Wars*, 1.

majority of historical accounts of water conflict involve domestic disputes. With this in mind, the first recorded intrastate conflict over water took place between two Sumerian cities during the Lagash-Umma border dispute in 2,500 BC.¹⁸ In this instance, the disruption of water was used as a military tool. While many water disputes that followed were intrastate, the same themes resurface at every point. Water can be used as a strategic military tool as well as the cause of serious internal disputes.¹⁹

Historical accounts support the claim that conflict over water tends to occur at an intrastate level; however, it is the escalation to the interstate level that concerns most scholars.²⁰ It is at this level that regional stability and security come into question. If allowed to reach this level, the potential of quickly resolving the conflict is low. Therefore, it is crucial to identify what causes interstate water tension. In most cases, these issues are the result of undeveloped resources and a lack of “structural stability” (where capable, accountable and responsive structures exist to peacefully manage and mitigate conflict and ensure respect for institutions and the rule of law).²¹ As Asia becomes a new focal point for water conflict, it is critical to devote attention to this region.

4. Debates on Water Wars

An interstate war over water could have exceptionally grave consequences for regional security and stability. There are two major views on the possibility of an Asian water war. The first holds that it is only a matter of time before major powers in Asia – China, India, and Pakistan in particular – wage a full-scale war over these resources. The

¹⁸ Water Conflict Chronology, <http://worldwater.org/conflictchronology.pdf> (accessed 3 October 2007); David W. Koeller, “Stele of the Vultures: War Between Umma and Lagash,” <http://www.thenagain.info/Classes/Sources/UmmaLagash.html> (accessed 13 May 2008).

¹⁹ Ibid.

²⁰ Water Conflict Chronology, <http://worldwater.org/conflictchronology.pdf> (accessed 3 October 2007); David W. Koeller, “Stele of the Vultures: War Between Umma and Lagash,” <http://www.thenagain.info/Classes/Sources/UmmaLagash.html> (accessed 13 May 2008).

²¹ OECD, “Water and Violent Conflict,” <http://www.globalpolicy.org/security/natres/water/2005/052605waterconflict.pdf> (accessed 3 October 2007).

second view maintains that a major war will break out only if plans to resolve water shortages, specifically in China, are not put into action.

Proponents of the first view, such as Fred Pearce, Chietigj Bajpae and Vandana Shiva, highlight the continued depletion of water resources and the lack of significant action to rectify the shortages. For example, in a recent interview, Pearce said, “Water conflicts of various sorts are happening all over the arid parts of the world. As more and more water is collected behind dams, and otherwise controlled, it is the powerful that get access to the water and the weak that lose. So there is a serious global issue about water governance.”²² Furthermore, Shiva highlighted the severity of the problem when she quoted economist Jack Hirshleifer:

Such abstract arguments miss the most crucial point - when water disappears, there is no alternative. For Third World women, water scarcity means traveling longer distances in search of water. For peasants, it means starvation and destitution as drought wipes out their crops. For children, it means dehydration and death. There is simply no substitute for this precious liquid, necessary for the biological survival of animals and plants.²³

As a result, it is assumed that these countries, when faced with the harsh reality of not being able to sustain their booming populations, will do whatever it takes to fix the problem – without considering the potential impact on their neighbors. These actions, it is agreed, will cause a domino effect, possibly leading to war.

The second view relates to the first; however, it highlights the need to turn conjecture into reality. Brahma Chellaney, Sandra L. Postel, and Aaron T. Wolf, all major proponents of this view, understand that conflict over diminishing water resources is possible.²⁴ Chellaney holds that “interstate conflict, however, will surface only when an idea is translated into action to benefit one country at the expense of a neighboring

²² Paul Comstock, California Literary Review Fred Pearce Interview, April 3, 2007: <http://calitreview.com/2007/04/03/an-interview-with-fred-pearce> (accessed 1 November 2007).

²³ Vandana Shiva, *Water Wars*, 15.

²⁴ Brahma Chellaney, “Averting Water Wars in Asia The Next Struggle;” Sandra L. Postel and Aaron T. Wolf, Global Policy Forum, “Dehydrating Conflict,” September 18, 2001: <http://www.globalpolicy.org/security/natres/water/2001/1001fpol.htm> (accessed 1 November 2007).

one.”²⁵ Additionally, analysts at the Swedish Water House believe that “the loudest alarmist calls for future ‘water wars’ have died away. Still, water as a source of international conflict seems to not only loom large in the public mind, but also in political circles.”²⁶ In other words, Asia will not face a war over water unless these actors (China, India, and Pakistan) actually act on proposed ideas to the detriment of others.²⁷ While they also acknowledge the overall depletion of world-wide water sources as a major concern, they do not agree that the mere fact will necessarily spiral Asia into war.

Regardless of their point of view, these scholars understand the importance of averting a water crisis in Asia. The differences are small, but they are all trying to accomplish a similar goal – raising awareness that the potential for war over water is a reality and that steps to avert conflict need be taken prior to the commencement of battle. Furthermore, they emphasize statistics that should raise eyebrows regarding the potential flash points between these countries and that highlight the problems that may arise as a result of conflict.

D. MAJOR QUESTIONS AND ARGUMENTS

The major question that is addressed in this thesis is whether China’s growing need for water resources will lead it to turn rhetoric into action by modifying the flow of key South Asian water sources originating in the Tibetan Plateau. China, India, and Pakistan are currently experiencing severe water shortages. This shared burden serves as the common denominator that could cause this situation to spiral out of control. Additionally, India and Pakistan have deep-seated tensions surrounding water issues due to a hasty partition in 1947. Therefore, if these actions are taken without any formal agreements or venues to resolve disputes, it may lead to major conflict and regional

²⁵ Brahma Chellaney, “Averting Water Wars in Asia The Next Struggle.”

²⁶ Swedish Water House, “Water and Conflict: a brief review of the academic literature and other sources,” October 2004, 3:
http://www.swedishwaterhouse.se/swh/resources/20050310144027Water_and_Local_Conflict.pdf
(accessed 1 November 2007).

²⁷ Ibid.

instability despite recently improved relations between these countries. This thesis attempts to determine whether peaceful solutions are feasible, and whether the risk of conflict is significant.

E. METHODOLOGY AND SOURCES

1. Methodology

This thesis uses a case study methodology to examine the effect that interstate competition over shared water resources might have on regional stability. Historically, the Middle East has been the focus of these concerns. However, recent evidence gathered indicates that by 2030 Asia could be facing a severely depleted water reserves. As a result, China, India, and Pakistan will be faced with major decisions with regard to ensuring their countries have ample water supplies. The outcome, if not handled properly, could result in conflict.

The analysis posits that there is a distinct pattern of independent variables (IV), dependent variables (DV) and intervening variables (IntV) in the two principal possible scenarios – interstate war or interstate agreement (see figure 4). In all cases, it is assumed, China, India and Pakistan face an inevitable crisis unless actions are taken to prevent water shortages and competition prior to the outbreak of violence. Therefore, the study shows that water scarcity, shared water sources and nuclear weapons are IV's affecting the DV's of interstate war or agreements. Furthermore, interstate competition over water serves as an IntV for interstate war, while interstate cooperation serves as an IntV for the conclusion of agreements.

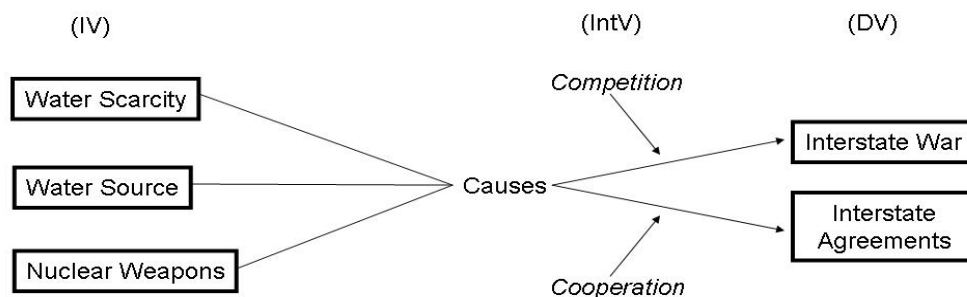


Figure 4. Methodology.

This thesis investigates the hypothesis that China's water crisis could, if not addressed in the near term, exacerbate regional tensions, possibly leading to war and serious regional instability.

2. Sources

There is an abundance of sources that focus on the world wide water crisis, South Asian water issues, and Chinese water problems. This thesis relies on numerous primary and secondary sources to provide a synopsis of the current trends in the relations among China, India and Pakistan. Additionally, the thesis leans heavily on statistical sources that quantify the potential for regional crisis over water. Finally, the use of maps throughout this thesis is critical to understanding the degree to which these countries are dependant on regional water sources. These sources provide the knowledge base required to make a reasonable assessment of the likelihood of conflict.

3. Thesis Outline

This thesis will begin by examining the overall world-wide water crisis in Chapter I. It will discuss the importance of the issue and discuss the current literature surrounding the problem. Chapter II will begin focusing on the countries of interest. It will start by looking at China's dilemma and its proposals to mitigate the impending water crisis through the building of massive dams and water diversion projects. Additionally, it will discuss its plans to focus efforts on the Tibetan Plateau as a solution to the countries water crisis. Chapter III will discuss the history of tension surrounding India and Pakistan. More specifically, it will note India and Pakistan's water scarcity issues and their efforts to address the problem via the 1960 Indus Water Treaty.

Finally, Chapter IV will discuss whether Beijing will turn rhetoric into action and the consequences associated with its options. Additionally, it will highlight the fact that there is no formal setting for countries in this region to settle disputes. It will also provide recommendations on what can be done to resolve the potential for conflict and the importance to the U.S.

II. CHINA'S WATER CRISIS: THE PROBLEM, CAUSES AND POSSIBLE SOLUTIONS

A. INTRODUCTION

China's access to fresh water is diminishing at a disturbing rate. Failure by Beijing to develop reasonable solutions may lead to insufficient accessible fresh water for Chinese citizens. Beijing's current solutions focus on massive projects that require significant financial commitment and cause an almost unnecessary burden on the people. Aside from the apparent financial burden, these projects also take a toll on farms, the ecology, and the forced migration of those in the vicinity of these projects.²⁸ These projects focus on long-term solutions. However, China's water situation is reaching a point at which long-term fixes may be too little too late (see Figure 5).²⁹

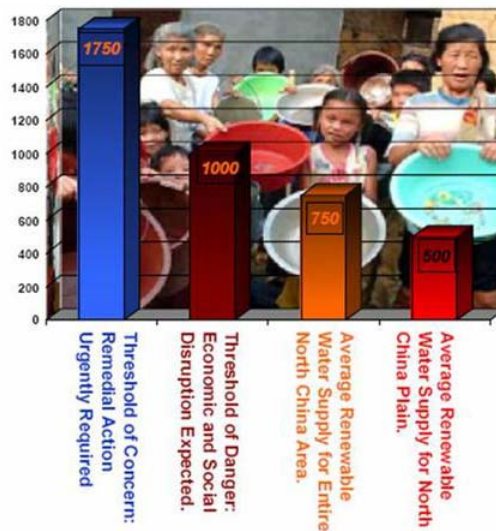


Figure 5. China's Water Dilemma.

²⁸ Carin Zissis, "China's Environmental Crisis," 9 February 2007 http://www.cfr.org/publication/12608/chinas_environmental_crisis.html#10 (accessed 13 May 2008).

²⁹ Figure 5 was taken from Dr. John McAlister, "China's Water Crisis," 22 March 2005, <http://www.cbiz.cn/download/aquabio.pdf> (accessed 14 November 2007).

Beijing's "top down" approach at managing this problem and reluctance to propose practical solutions may cause an irreversible water dilemma in China – ultimately eliminating China's water self-sufficiency.³⁰ If allowed to reach this level, Beijing will need to look elsewhere in order to address its needs. These more extreme solutions may require tapping into water resources located on the Tibetan Plateau that also supplies China's neighbors. If forced to do this, the lack of interstate water agreements and the already present regional tension over water may serve as a flash point for conflict.

This chapter examines China's water problem and how it relates to India and Pakistan. More specifically, it determines the major causes of this problem, and it evaluates how Beijing is trying to mitigate them and address some of the regional security implications. The result is a better understanding of China's efforts to save its environment and how lack of action may lead to more significant issues – including massive human suffering, economic regression, and possible conflict with its neighbors.

B. SOURCES OF CHINA'S WATER

There are three main sources of China's water. They are glaciers, surface water and ground water. Currently, the overall volume of fresh water is not the main issue. The main issue is how China is treating the water it has access to. As discussed below, China's industries, massive population, and resource mismanagement are all contributing to its current water crisis. The bottom line is that China's access to fresh water and overall water levels are diminishing.

1. Glaciers

The Tibetan Plateau serves as a primary source of China's water. It covers most of the Tibet Autonomous Region and Qinghai province in the People's Republic of China (PRC). Some 49,873 square kilometers of this plateau serve as the source of China's two

³⁰ Wang Xinbo, *The Water Revolution* (2006), 147.

main rivers – the Yellow River and the Yangtze River.³¹ In addition, the Tibetan Plateau serves as a life-line for China's neighbors, including India and Pakistan via the Indus, Ganges and Brahmaputra River systems.³²

2. Surface Water

China's surface water is provided by five main rivers and numerous lakes. These resources are continually replenished by glacial melting and rainfall (see Figure 6).³³ These sources of water are currently feeling the most significant impact of China's water dilemma. China maximizes the use of these rivers and lakes to generate hydroelectric power, to support transportation, and to support industrial expansion. However, it comes at a great cost to the environment. These dams and industrial facilities are draining China's water supply to a point that could not only cause the eventual drying up of these rivers, but leave its citizens without access to fresh water.

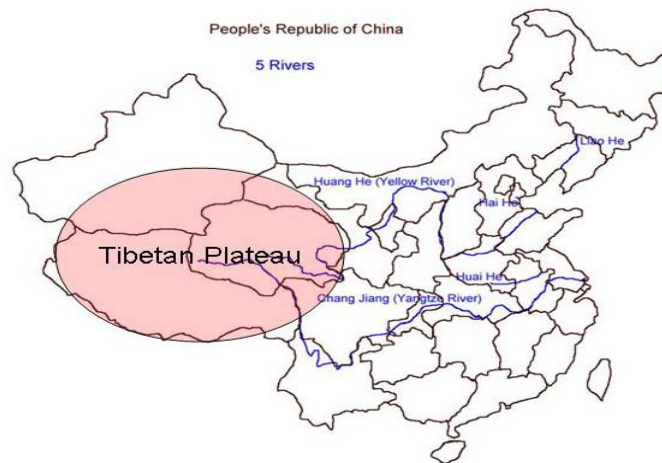


Figure 6. The Tibetan Plateau and China's Major Rivers.

³¹ WWF Nepal Program, "An Overview of Glaciers, Glacier Retreat, and Subsequent Impacts in Nepal, India and China," March 2005, 39, <http://assets.panda.org/downloads/himalayaglaciersonreport2005.pdf> (accessed 14 November 2007).

³² WWF Nepal Program, "An Overview of Glaciers, Glacier Retreat, and Subsequent Impacts in Nepal, India and China"; Aloys Arthur Michel, *The Indus Rivers: A Study of the Effects of Partition* (New Haven and London: Yale University Press, 1967), 24-25.

³³ Figure acquired from http://www.chinacp.com/eng/cppolicystrategy/cp_rivers_lakes.html (accessed 14 November 2007).

Of China's major rivers, the Yangtze and the Yellow Rivers are the most important. The Yangtze is 3,900 miles long – making it the longest river in China.³⁴ It runs south out of the Tibetan Plateau and eventually turns east across central China. On its way to the South China Sea, the Yangtze River flows through the Three Gorges Dam.³⁵ This river serves two main purposes for China. First, it is a major transportation route in south China. Second, it provides a significant source of electrical power with the recent completion of the Three Gorges Dam.³⁶ However, these advantages are not without consequences. The Three Gorges Dam is the source of major pollution upstream. While the dam produces energy, it does not allow the free flow of the river. As a result, the water becomes heavily polluted due to the restricted flow. Additionally, the construction of the dam resulted in the displacement of numerous Chinese citizens – two issues Beijing is currently struggling to address (see figure 7).³⁷ Therefore, the decision to protect the environment by limiting the amount of dams restricting the flow of China's rivers versus continued economic progress is the primary source of contention.

³⁴ Cleaner Production in China, Rivers and Lakes Identified for Environmental Protection, http://www.chinacp.com/eng/cppolicystrategy/cp_rivers_lakes.html#ChangJiang (accessed 14 November 2007).

³⁵ New York Times, "Chinese Dam Projects Criticized for Their Human Costs," Jim Yardley, http://www.nytimes.com/2007/11/19/world/asia/19dam.html?pagewanted=1&_r=1&ei=5089&en=e41f237d379a6b10&ex=1353214800&partner=rssyahoo&emc=rss (accessed 19 November 2007).

³⁶ Cleaner Production in China, Rivers and Lakes Identified for Environmental Protection, http://www.chinacp.com/eng/cppolicystrategy/cp_rivers_lakes.html#ChangJiang (accessed 14 November 2007); Three Gorges Bulletin, Progress of the Three Gorges Project, <http://www.zhb.gov.cn/english/quality/3Gorges/index.htm> (accessed 14 November 2007); Tibetan Bulletin Online, "Policy Implications of Current Dam Projects on Drichu – the Upper Yangtze River," Tashi Tsering, <http://www.tibet.net/en/tibbul/2005/0102/environment1.html>, (accessed 14 November 2007).

³⁷ International Rivers, "Three Gorges Dam," <http://internationalrivers.org/en/image/tid/111?page=1> (accessed 13 May 2008).

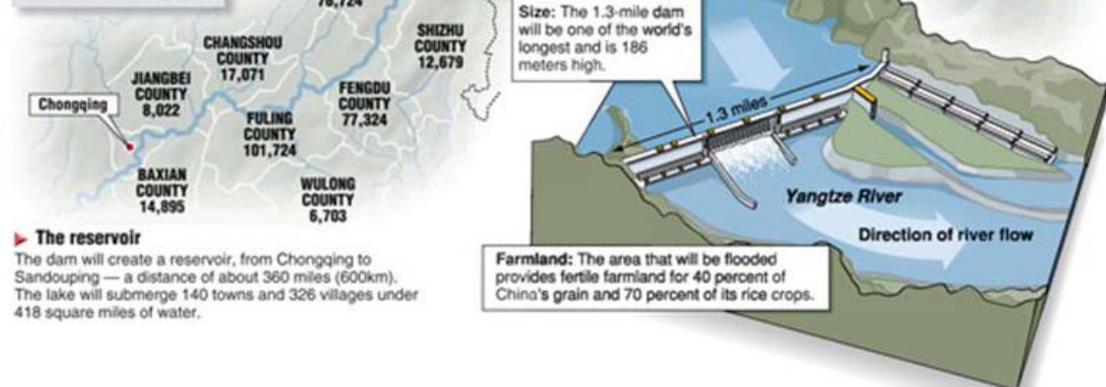
Uprooting more than a million people

By building the world's largest dam across the world's third-longest river, China will force nearly 1.2 million people to move from fertile farmlands along the Yangtze and will affect the lives of roughly 400 million people who live along its

► Relocation by county

Nearly 1.2 million people are being moved from the banks of the Yangtze in the largest dam-forced human migration in history. Much of the land these refugees are being moved to is either too steep or too poor to farm.

KEY	
-----	Provincial boundary
-----	County boundary
CHANGSHOU COUNTY 17,071	County name and number of relocations



► The reservoir

The dam will create a reservoir, from Chongqing to Sandouping — a distance of about 360 miles (600km). The lake will submerge 140 towns and 326 villages under 418 square miles of water.

Figure 7. China's Three Gorges Dam.

The Yellow River is the second longest river in China – estimated to be 3,390 miles long. The Yellow River, like the Yangtze River, also begins at the Tibetan Plateau. It runs through north China and provides millions of people with water.³⁸ This river, however, is a curse as well as a blessing. The Chinese have tried to control the flooding of this river for centuries, but such efforts have been in vain. The river has risen nearly 70 feet in some locations and the Chinese still experience disastrous floods as a result.³⁹ Furthermore, in addition to severe flooding, the Yellow River is also becoming excessively polluted as a result of industrial waste and resource mismanagement.

³⁸ Cleaner Production in China, Rivers and Lakes Identified for Environmental Protection, http://www.chinacp.com/eng/cppolicystrategy/cp_rivers_lakes.html#ChangJiang (accessed 14 November 2007).

³⁹ Ibid.

3. Ground Water

Ground water reserves are created from rivers flowing over the land and seeping into the ground. At this point, wells are drilled in order to access this water for drinking or agricultural irrigation. China gets approximately 70 percent of its drinking water and about 40 percent of its agricultural irrigation waters from these sources.⁴⁰ Therefore, it is clear that ground water is a major source of fresh water for China. But these reserves are also feeling the effects of pollution and mismanagement. There are numerous documented events of groundwater reserves being contaminated by local industrial plants. For example, groundwater reserves in a small village outside of Beijing are being ruined due to a zinc-plating plant nearby.⁴¹ Although efforts are being made to resolve this issue, it is not receiving the amount of attention it warrants. Yin Yueping (an expert with Chinese Geological Survey) states that “China’s groundwater management is about 20 years behind the worlds’ most advanced levels.”⁴²

C. CHINA’S WATER RESOURCES: EXAMINING ITS PRIMARY USERS

There are three primary consumers of China’s water supply: domestic users, agricultural users, and industrial users. The overall consumption of China’s water is also on the rise. In 1980, China’s water consumption was estimated to be approximately 443.7 billion cubic meters. As a result of increased demand, the overall usage rose to 518.7 in 1993 and 543.5 in 1998 – a 22 percent increase from the 1980 figure.⁴³ Due to the rate of growth expected in these areas, the demand on China’s water resources is expected to rise. This level of growth without necessary safeguards only complicates the problem and some estimates suggests that by 2030, the 1998 water use estimate may

⁴⁰ World Watch Institute, “China’s Groundwater Future Increasingly Murky,” Yan Zhan, <http://www.worldwatch.org/node/4753> (accessed 19 November 2007).

⁴¹ Ibid.

⁴² Ibid.

⁴³ Charles Wolf, Jr., et al., *Fault Lines in China’s Economic Terrain* (Santa Monica, CA: Rand, 2003), 79.

double.⁴⁴ More specifically, the increase in water use also increases the amount of waste water produced.⁴⁵ Therefore, the issue of regional lake and river pollution is compounded. Additionally, if consumption continues at this rate without plans to conserve, the volume of consumed fresh water will likely reach an unacceptable level in coming decades.

1. Domestic Use

China's population is currently in excess of 1.3 billion, according to a July 2007 Central Intelligence Agency estimate.⁴⁶ China is the most populous country in the world, and its population is expected to rise to approximately 1.5 billion by 2030.⁴⁷ Therefore, as the population rises, the overall water demand will also increase. It is this rising demand that poses a major problem for China's water reserves. Additionally, this increase may eventually cause China's domestic users to surpass the industrial and agricultural users as the biggest consumer on water.

China's increasing population is also causing a major dilemma for already over-populated urban areas. Therefore, there are major efforts being undertaken to increase the overall amount of freshwater accessible to those living in these urban areas – in some cases a deliberate diversion of water from rural to urban areas. As a result, people living in rural areas are being forced to migrate into these urban areas in order to have access to the water.⁴⁸ The impact that domestic use will have on China's overall water resources is highlighted by Lester R. Brown, when he states that “between now and 2010, when China's population is projected to grow by 126 million, the World Bank projects that the

⁴⁴ Ibid., 82.

⁴⁵ Charles Wolf, Jr., et al., *Fault Lines in China's Economic Terrain* (Santa Monica, CA: Rand, 2003), 82.

⁴⁶ Central Intelligence Agency: *The World Fact Book*, China, <https://www.cia.gov/library/publications/the-world-factbook/geos/ch.html> (accessed 21 November 2007).

⁴⁷ World Water Conservation, “China's Water,” <http://worldwaterconservation.com/chinawater1.html> (accessed 21 November 2007).

⁴⁸ Gavan McCormack, “Water Margins: Competing Paradigms in China,” *Critical Asian Studies*, 33:1 (2001).

country's urban water demand will increase from 50 billion cubic meters to 80 billion, a growth of 60 percent. Industrial water demand, meanwhile, will increase from 127 billion to 206 billion cubic meters, an expansion of 62 percent.”⁴⁹

2. Agricultural Use

Agriculture is estimated to be the biggest consumer of China's water supply; however, the overall increase in consumption has been relatively low in relation to the other consumers.⁵⁰ The agricultural sector uses approximately 400 billion cubic meters of water, and its use is expected to rise to nearly 665 billion by 2030.⁵¹ This increase in production is primarily due to the growth of an affluent middle class that is beginning to consume more expensive products, such as pork, chicken, beef and eggs.⁵² Therefore, those employed in the agricultural sector are expected to increase output, which ultimately takes a major toll on the overall water resources available.

The majority of China's farmers are located in the dry northern provinces. Due to the extreme conditions, these provinces rarely have access to river water as a majority of them dry up prior to reaching the plains.⁵³ Consequently, these users are forced to tap into China's precious ground water reserves. The overuse of this source is causing great concern for Chinese environmentalists and Beijing. It is causing a rapid decline in available groundwater for production and adds to China's severe water dilemma.

3. Industrial Use

China's obsession with economic growth is becoming one of the most significant contributors to its overall water shortage. Lately, China is focusing all its attention on ensuring economic development with inadequate concern for the environment – evident

⁴⁹ Lester R. Brown, “Worsening Water Shortages Threaten China's Food Security,” <http://www.earth-policy.org/Updates/Update1.htm> (accessed 21 November 2007).

⁵⁰ Charles Wolf, Jr., et al., *Fault Lines in China's Economic Terrain*, 80.

⁵¹ World Water Conservation, “China's Water,” <http://worldwaterconservation.com/chinawater1.html> (accessed 21 November 2007).

⁵² Ibid.

⁵³ Charles Wolf, Jr., et al., *Fault Lines in China's Economic Terrain*, 85.

by its excessive use of coal and water resources throughout the country.⁵⁴ Although China's economic growth has been significant, it is imperative that it focus on balancing this goal with preserving the environment. Otherwise, China is likely to see a decline in economic growth once the water is no longer useable.⁵⁵

The industrial use of water is also more profitable than the agricultural use. It is estimated that "a thousand tons of water produces one ton of wheat, which has a market value of \$200, whereas the same amount of water used in industry yields an estimated \$14,000 of output – 70 times as much."⁵⁶ Therefore, it is clear that it is in Beijing's best interest to ensure the industrial sector receives the lion's share of available water resources. As a result, China's agricultural production will decrease and make it difficult for China to remain self-sufficient with regard to feeding its people. Additionally, the lack of internal production may force China to import food, causing a possible decrease in its overall gross domestic product – China's estimated 2004 agricultural exports were valued at 20.37 billion (USD).⁵⁷

D. THE ROAD TO CRISIS: FACTORS CONTRIBUTING TO CHINA'S IMMINENT WATER EMERGENCY

There are several factors contributing to China's water crisis. They include increasing demand, climate change, inefficient use, and pollution. Of the four mentioned, increasing demand was discussed above in connection with increased population. Additionally, climate change is a serious problem. As a matter of fact, it is a major issue for the glaciers located on the Tibetan Plateau that serve as the major source for China's rivers. However, the following sections tackle the most significant contributor to China's

⁵⁴ Elizabeth C. Economy, "China's Environmental Challenge: Political, Social and Economic Implications," http://www.cfr.org/publication/5573/chinas_environmental_challenge.html (accessed 21 November 2007).

⁵⁵ Ibid.

⁵⁶ Ibid.

⁵⁷ People's Daily Online, "China's Agricultural Exports to Grow 10 Percent in 2004," http://english.peopledaily.com.cn/200412/29/eng20041229_169111.html (accessed 21 November 2007).

water crisis: inefficient use and pollution. These two factors, if addressed by the Chinese government, could significantly lessen the growing water burden.

1. Inefficient Use

The current Chinese water crisis rests solely on the shoulders of the government. A myriad of ineffective laws (to be discussed in the follow-on sections) contribute to the current situation. Current law allows water to be accessed for a fraction of the cost it should be and so give little incentive to conserve. As a result, Chinese typically use the water as fast as they can get their hands on it. Additionally, with the level of water quality going down, Chinese citizens are beginning to use it faster in order to ensure it is not completely unusable. Finally, China's limited water handling technology and inadequate concern for the resource, until now, adds to this problem.

China's irrigation system is extremely inefficient. It is estimated that a majority of the water channeled through these systems seeps back into the ground prior to being utilized by the consumer.⁵⁸ It is also estimated that approximately 400 million cubic meters of water is lost annually due to these irrigation systems.⁵⁹ Due to these disturbing statistics, Chinese experts are calling on Beijing to make changes. These experts are asking the government to "raise public awareness of water conservation, adopt new irrigation methods, and spread the use of water-efficient facilities."⁶⁰

China's use of dams to store water and generate hydroelectric power is also reaching a level of obsession. In 2003, China, along with Turkey, Iran, and Japan, accounted for 67 percent of the world's dams. Additionally, China has a total of 88 dams under construction and another 36 planned.⁶¹ These dams are either poorly constructed

⁵⁸ People's Daily Online, "Inefficiency Aggravates China's Water Shortage," http://english.people.com.cn/200611/22/eng20061122_324042.html (accessed 21 November 2007).

⁵⁹ Ibid.

⁶⁰ Ibid.

⁶¹ WWF, "Dam Facts and Figures," http://www.panda.org/about_wwf/what_we_do/freshwater/our_solutions/policy_practice/dams_initiative/quick_facts/index.cfm (accessed 21 November 2007).

or aging.⁶² Furthermore, China does not comply with a 2000 report from the World Commission on Dams that states “the end of any dam project must be the sustainable improvement of human welfare. This means a significant advance of human development on a basis that is economically viable, socially equitable, and environmentally sustainable. If a large dam is the best way to achieve this goal it deserves our support. Where other options offer better solutions we should favor them over large dams.”⁶³ This is most clearly evident with respect to China’s construction of the Three Gorges Dam. The overall environmental impact was immense and the human displacement total reached nearly 1.13 million people.⁶⁴ These dams are not built with the environment in mind. They are constructed to serve industrial and economic growth. Until now, Beijing did not care about the repercussions. Increasingly, China is caught between a rock and a hard place trying to revitalize the resource it is exhausting.

2. Pollution

Similar to the inefficient use of water, the degree of pollution plaguing China’s water can be tied back to Beijing’s ineffective management of the environment. The primary reason for this problem appears to be ineffective and un-enforced environmental codes. Additionally, industry bribes officials to overlook certain violations.

The overall increase in water usage also generates an increase in waste water – nearly 21,000 chemical companies line China’s two main rivers.⁶⁵ In combination with China’s obsessive damming efforts, this waste water is rendering most of China’s surface water unsuitable for use. In 2006, “more than 26 billion tons of waste water was pumped

⁶² China Daily, “One-Third of China’s Dams Unsafe,” http://www.chinadaily.com.cn/china/2006-08/08/content_659827.htm (accessed 21 November 2007).

⁶³ The Report of the World Commission on Dams, “Dams and Development: A New Framework for Decision-Making,” 2000, 1, <http://www.dams.org/docs/report/wcdreport.pdf> (accessed 21 November 2007).

⁶⁴ New York Times, “Chinese Dam Projects Criticized for Their Human Costs,” Jim Yardley, http://www.nytimes.com/2007/11/19/world/asia/19dam.html?pagewanted=1&_r=1&ei=5089&en=e41f237d379a6b10&ex=1353214800&partner=rssyahoo&emc=rss (accessed 19 November 2007).

⁶⁵ Frontline, “Water Woes,” Pallavi Aiyar, <http://www.flonnet.com/fl2412/stories/20070629000105900.htm> (accessed 21 November 2007).

into the Yangtze, which flows through 11 Chinese provinces and municipalities.”⁶⁶ Joseph Kahn and Jim Yardley recently wrote that “public health is reeling. According to the Ministry of Public Health, pollution contributes to cancer as China’s leading cause of death. Ambient air pollution alone is blamed for hundreds of thousands of deaths each year. Nearly 500 million people lack access to safe drinking water.”⁶⁷ Furthermore, Khan and Yardley go on to say that “China is choking on its own success. The economy is on an historic run, posting a succession of double-digit growth rates. But the growth derives, now more than at any time in the recent past, from a staggering expansion of heavy industry and urbanization that requires colossal inputs of energy, almost all from coal, the most readily available, and dirtiest, source.”⁶⁸

Surface water is not the only source being impacted by this issue of pollution. As the pollutants seep into the ground, it contaminates the soil being used for farming as well as the groundwater reserves. The result of this excessive pollution, according to the National Environmental Protection Agency, is that “70 percent of China’s rivers and lakes are polluted to some degree; the water of 28 percent is unsuitable even for irrigation. Moreover, 90 per cent of the ground water in the cities is too polluted to drink. As a result, several hundred million Chinese lack access to safe water.”⁶⁹

E. GOOD INTENTIONS, BAD EXECUTION: BEIJING’S EFFORTS TO MITIGATE THIS CRISIS

Historically, China’s concern for environmental issues has been limited. However, this is not to say it has been doing nothing – the current water laws indicate that Beijing is prioritizing environmental issues. It is clear, however, that it is a secondary concern. Moreover, China remains focused on the growth of its economy,

⁶⁶ Frontline, “Water Woes,” Pallavi Aiyar, <http://www.flonnet.com/fl2412/stories/20070629000105900.htm> (accessed 21 November 2007).

⁶⁷ The New York Times, “As China Roars, Pollution Reaches Deadly Extremes,” Joseph Kahn and Jim Yardley, <http://www.nytimes.com/2007/08/26/world/asia/26china.html> (accessed 21 November 2007).

⁶⁸ Ibid.

⁶⁹ Frontline, “Water Woes,” Pallavi Aiyar, <http://www.flonnet.com/fl2412/stories/20070629000105900.htm> (accessed 21 November 2007).

regardless of what costs it incurs along the way. Unless Beijing reverses its existing laws and emphasizes enforcement, it will continue to combine good intentions with poor execution. The result could be catastrophic.

1. Beijing's "Top-Down Approach" – The 1988 Water Law

The "top-down" approach originates from Beijing's centralized approach to governance and ties into water management through the 1988 Water Law – defined in Article 3.⁷⁰ In order to execute this law, Beijing created the Ministry of Water Resources (MWR) with the responsibility of enforcing the state's ownership of the water. In order to complete this task, the MWR assigned water management duties to lower-level agencies – located near the rivers and basin areas. The MWR then established a hierarchical system that requires all local agencies to periodically report back in order to keep Beijing informed through communication with the MWR.⁷¹ While this approach fits the overarching method of Chinese governance, it is extremely cumbersome and limits the amount of quality control China can actually impress upon this resource. As a result, China continues to struggle with the deterioration of its water supply.

China's governing style also leaves little room for the consideration of opinion outside of Beijing's politicians. Moreover, China continues to focus a majority of its efforts on maintaining the well-being of the state. Nevertheless, as the environmental situation becomes more dangerous, the public and some national constituents are becoming more vocal. These efforts to influence Beijing, however, are currently fruitless as Beijing continues on its chosen path to build more dams and explore exploitation of the Tibetan Plateau.⁷² In order to more effectively deal with this crisis, it is imperative to do away with the antiquated top-down approach, adopt a more decentralized form of water management and revise and enforce current laws.

⁷⁰ Wang Xinbo, *The Water Revolution*, 151, <http://www.sdnetwork.net/files/pdf/chapter6-xinbo.pdf> (accessed 21 November 2007); Law of the PRC, Water Law 1988, <http://www.asianlii.org/cn/legis/cen/laws/wl198895/> (accessed 21 November 2007).

⁷¹ Wang Xinbo, *The Water Revolution*, 150 (accessed 21 November 2007).

⁷² Madeleine Lynn, "Ethics Be Dammed? China's Water Projects," 10 January 2007, http://www.cceia.org/resources/ethics_online/0005.html (accessed 21 November 2007).

The top-down approach was doomed to fail from the outset. It is maintained by relying on three main assumptions: First, the government maintains accurate measures of available national water supplies, local surface water supplies, and local groundwater resources. Additionally, it assumes that the government can respond to any sudden changes in this supply. Second, the government is capable of enforcing restrictions. Finally, the government is concerned about taking care of public interests by avoiding the acceptance of bribes or coercion by influential locals.⁷³ In reality, these expectations cannot be accomplished for a number of reasons, including outdated data on water availability versus use, corruption, cost, and lack of inter-provincial coordination. As a result, the top-down approach has spawned what is termed a “pump race.”⁷⁴ In other words, it encourages people to get water before it is all gone. Finally, this approach has also resulted in water disputes – in some cases violent ones.⁷⁵ Under this law, the propensity for conflict to arise over water is high. Therefore, Beijing needs to consider not only revising its laws, as was done in 2002, but also enforcing its laws. Otherwise, water issues could become international problems – an event that could lead to conflict and regional instability.

2. 2002 Water Law Revision

The 2002 revision of China’s water law marks a significant step in China’s efforts to address this crisis. While far from perfect, the law seeks to establish the concept of “water rights.”⁷⁶ However, this change is being implemented in the old centralized methodology of governance. In order to revamp the process, it is important that Beijing implement a decentralized approach at water governance. According to Wang Xinbo,

⁷³ Wang Xinbo, *The Water Revolution*, 151, <http://www.sdnetwork.net/files/pdf/chapter6-xinbo.pdf> (accessed 21 November 2007).

⁷⁴ Ibid., 153.

⁷⁵ Ibid.

⁷⁶ Ibid., 154.

such a decentralized approach “might involve water user associations and the public more generally.”⁷⁷ This approach would help ensure that water users have incentives to conserve vice motivation to waste.

The revisions to the 1988 water law lend credibility to Beijing’s efforts to implement change. They include the “reiteration of the state ownership of water resources, defining the water use rights of the collective agricultural economic organizations, adding some control systems such as water amount allocation system, the combination of the total quantity control and quota management and sets up water abstraction rights.”⁷⁸ These changes are a step in the right direction; however, the big step will be when Beijing truly decentralizes the system. It is clear that Beijing is aware of the need for water rights, however, its reluctance to let go of the “top-down” approach leads researchers to believe that it remains focused on its primary goal of economic development or is highly corrupt.⁷⁹ Nevertheless, the following three examples support the claim that Beijing’s focus toward implementing water rights is moving in the right direction: 1. the first effective transfer of water rights took place between Dongyang City and Yiwu City. In this case, Dongyang transferred the use of 50 million cubic meters of water to Yiwu;⁸⁰ 2. In 2001-2002, the provinces of Shanxi and Henan transferred a total of 60 million cubic meters of water between each other;⁸¹ 3. In 2004, the Yellow River, Ningxia and Inner Mongolia agreed to invest in water conservation projects and the transfer of water rights under the auspices of the MWR. These agreements motivated eight large industrial projects to support the utilization of water rights.⁸²

⁷⁷ Wang Xinbo, *The Water Revolution*, 151, <http://www.sdnetwork.net/files/pdf/chapter6-xinbo.pdf> (accessed 21 November 2007).

⁷⁸ Wang Xinbo, *The Water Revolution*, 153, <http://www.sdnetwork.net/files/pdf/chapter6-xinbo.pdf> (accessed 21 November 2007), 154.

⁷⁹ Ibid., 154.

⁸⁰ Ibid.

⁸¹ Ibid.

⁸² Ibid.

3. Colossal Water Diversion Projects: Beijing's Near-Term Solution

The extent of China's water crisis has caused Beijing to propose two major projects that involve the transfer of water from one region to another. The first is referred to as the south to north water diversion project.⁸³ Proposed by Mao Zedong in 1952, this project is scheduled to be completed in 2050, and it will divert approximately 44.8 million cubic meters of water to drier Northern provinces.⁸⁴ Upon the completion of this massive project, the estimated cost of linking China's four main rivers (the Yangtze River, the Yellow River, the Huaihe River, and the Haihe River) will be approximately \$62 billion (USD) (see Figure 8).⁸⁵



Figure 8. The South to North Water Diversion Project.

⁸³ Water-Technology.net, "South-to-North Water Diversion Project, China," http://www.water-technology.net/projects/south_north/index.html#south_north1 (accessed 15 May 2008).

⁸⁴ Water-Technology.net, "South-to-North Water Diversion Project, China," http://www.water-technology.net/projects/south_north/index.html#south_north1 (accessed 15 May 2008).

⁸⁵ Water-Technology.net, Map of South-North Water Diversion Project, China, http://www.water-technology.net/projects/south_north/south_north1.html (accessed 15 May 2008).

The benefits of this project are apparent, it will undoubtedly provide Northern China with the water it desperately needs. However, like other major dam projects, this one also has severe consequences. Like the Three Gorges Dam, the south-to-north water diversion project will displace many Chinese citizens – similar to the one million plus displaced during the building of the Three Gorges Dam. The project also poses a risk to critical land required for farming. Finally, Beijing plans to build additional industrial complexes along the routes of the project. The additional industries may add to the water pollution problem Beijing is trying to combat.

The second major project is referred to as the great western route diversion project.⁸⁶ This project causes the most concern for China's neighbors, and it is the most contentious. However, there are limited details on the size, scope, and reality of this project. Additionally, despite what some unnamed sources in Beijing claim, government officials vehemently deny any intention to move forward with such a project.⁸⁷ In response to these allegations, China's Minister for Water Resources, Wang Shucheng, said that this project is "unnecessary, unfeasible and unscientific."⁸⁸ Regardless of Beijing's actual intentions, the decision to move forward with this plan could cause severe tension between China and India.

F. CHINESE WATER SCARCITY: THE CONSEQUENCES

There are numerous consequences that may result from China's water dilemma. However, the three major consequences include a severe impact on Chinese citizens, a possible economic regression, and the potential for international conflict. The fact that Chinese citizens are beginning to voice their opinions – although not totally being heard

⁸⁶ Environment and Development Desk, Department of Information and International Relations, Central Tibetan Administration, Tibet: A Human Development and Environment Report, 2007, Chapter Five, 122 <http://www.tibet.net/en/diir/pubs/edi/tib2007/chap-5.pdf> (accessed 15 May 2008).

⁸⁷ Indrani Bagchi, "China's River Plan Worries India," 23 October 2006, http://timesofindia.indiatimes.com/India/Chinas_river_plan_worries_India/articleshow/msid-2229977,curpg-1.cms (accessed 15 May 2008).

⁸⁸ Reuters, "China Water Officials Denies Plan to Dam Indian River," 21 November 2006 <http://today.reuters.com/News/CrisesArticle.aspx?storyId=PEK165504> (accessed 15 May 2008).

yet – on the severity of this crisis leaves responsibility for change on Beijing’s shoulders. As the research shows, it is imperative that Beijing assess China’s environmental crisis before it is too late.

1. Are Beijing’s Policies Killing China’s People?

Beijing’s focus on economic development is placing industry first and its environment second. As a result, Beijing is focusing on massive projects to harness water in order to make power – such as the Three Gorges Dam. Additionally, it is also focusing on massive projects to remedy the problem its policies are causing – such as the south-north water diversion project and the great western route water transfer project. These projects are costing billions of dollars, causing severe water pollution problems in urban and rural areas alike, and resulting in massive migrations of people from these areas with little compensation. For China to begin managing this problem, it must shift its focus solely on economic development to managing the whole picture. This involves not only developing more efficient ways to conserve water, but also an effort to revise and enforce the water laws.

2. Economic Regression

The irony of Beijing’s primary focus on economic development is that it may eventually contribute to its demise.⁸⁹ Moreover, the volume of waste water dumped into China’s rivers and lakes renders existing water supplies unusable. China’s industries, which are highly reliant on water and coal for power, may be unable to sustain their current pace of production. Therefore, China’s current booming growth may bottom out or recede. This underscores the importance of water conservation for Beijing. In other words, China’s current prosperity is directly related to the country’s water quality, and it will be required to make some serious changes with regard to its current industrial operations.

⁸⁹ Jacques DeLisle, “China Rising: Assessing China’s Economic and Military Power,” <http://www.fpri.org/enotes/200710.delisle.chinarising.html> (accessed 26 November 2007).

3. Interstate Conflict

The most problematic outcome of this crisis is the potential for international conflict. This is the case because it not only affects the countries involved, but it also disrupts regional stability. Historically, water problems have provoked conflict.⁹⁰ China's current water crisis may portend future conflict. In other words, it is apparent that attempts to modify the existing rivers in China may impact its neighbors – who are also experiencing water shortages. This emphasizes the importance of developing water sharing agreements.

China has already completed numerous projects that have angered its neighbors. These include dam projects on the Mekong that affect Vietnam, Laos, Cambodia and Thailand. Additionally, China's past and future plans to construct dams on the Brahmaputra River have also caused great concern in India.⁹¹ Finally, Chinese plans to tap the resources of the Tibetan Plateau are the most significant cause of concern – although Beijing is reluctant to share specifics regarding its plans.⁹² There are severe implications if Beijing goes forward with such plans without international agreement. More specifically, the plans to utilize this resource could affect not only Southeast Asia but the rivers of China's more volatile nuclear neighbors, India and Pakistan, who already experience tension over water sharing.

G. CONCLUSION

China's water crisis will get worse before it gets better – if it gets better at all. There are numerous reasons why water is becoming a major dilemma for Beijing because of over population, pollution and mismanagement. However, the most important priority to examine is what Beijing is doing to mitigate the problem. China's water crisis has the

⁹⁰ Water Conflict Chronology, <http://worldwater.org/conflictchronology.pdf> (accessed 26 November 2007).

⁹¹ Bangladesh News, "China Plans to Divert Brahmaputra Waters," <http://www.bangladeshnews.com.bd/2007/05/08/china-plans-to-divert-brahmaputra-waters/> (accessed 26 November 2007).

⁹² Brahma Chellaney, "China Aims for Bigger Share of South Asia's Water Lifeline," Yale Global Online, <http://yaleglobal.yale.edu/display.article?id=9377> (accessed 26 November 2007).

potential to generate severe consequences. These include, but are certainly not limited to, massive human suffering, economic regression and the potential for interstate conflict.

Beijing is attempting to change its current water governance infrastructure. This is not to accuse Beijing of lack of action. However, it is to raise awareness that it may not be doing enough. Beijing still utilizes top-down methods to the issues, and it is clear that its focus is not adequately on the environment. The first step in making positive changes requires Beijing to decentralize its water governance sector. If this is accomplished, it will likely give teeth to the recently revised water law and possibly start an upward trend of water conservation.

Beijing's top-down approach is causing it to overlook effective solutions to this dilemma. It is currently ignoring calls to limit the scale of dams and major projects being pursued. Thus far, it has already completed the Three Gorges Dam. It is in the process of constructing the south to north water diversion project and it has numerous other dams planned in the future. It is reluctant to consider and implement more cost effective methods to address this issue. For example, Beijing is hesitant to raise the price of water – a solution that would certainly persuade people to conserve. Additionally, it is unclear what Beijing's stance is on desalinization plants.

The possible consequences of this water crisis are intimidating. Of the three discussed, the most serious is the possibility of international conflict between China, India and Pakistan. China's construction of dams or water diversion projects on the Tibetan Plateau would severely exacerbate regional water tensions. The implications of such plans would affect more than just India and Pakistan. But the potential for a nuclear exchange shifts the focus to this triad. It is unclear whether Beijing is considering these ramifications during its planning sessions, but it is imperative that it do so. A decision to ignore its neighbors during this time of water scarcity could result in disastrous consequences.

China's water crisis is reaching a dangerous point. The IV and DV model addressed in figure four highlight the possible outcomes for this impending crisis. China's IV's are reaching a level where the potential for cooperation or competition are

becoming a reality. If China's dwindling water supply is allowed to reach an unacceptable level, it will be forced to take action which will likely include exploiting the resources of the Tibetan Plateau.

Beijing's proposed plans to tap into the water resources of the Tibetan Plateau are in the development stage. There are no interstate agreements between China, India, and Pakistan that delineate who can tap into the headwaters of the Indus, Brahmaputra, and the Ganges Rivers. Therefore, if Beijing puts these plans into action without any interstate agreements, it could lead to significant competition over these resources resulting in war. The only action that could lead to the more desirable outcome of interstate agreement is to be proactive and help these countries develop water sharing agreements that could foster cooperation vice competition.

The following chapter will discuss the challenges facing South Asia. More specifically, it will examine the role that India and Pakistan play in this potential crisis over dwindling water resources. It will examine the history of tension between these states, the issues surrounding their water scarcity and efforts to mitigate the potential for conflict over these dwindling resources.

THIS PAGE INTENTIONALLY LEFT BLANK

III. THE SOUTH ASIAN WATER CRISIS: THE PROBLEM, CAUSES AND POSSIBLE SOLUTIONS

Wars will be fought between nations over water.

- *UN Secretary General Kofi Annan*⁹³

A. INTRODUCTION

The partition of the Indian subcontinent in 1947 gave birth to a long history of conflict between India and Pakistan. The region remains prone to conflict and instability as a result of these deep-seated tensions. The source of this instability primarily revolves around several major issues. Of these issues, the Kashmir region remains the most contentious. Despite decades of multilateral and bilateral talks over Kashmir, the issue remains contentious, unresolved and the primary source of water resource tension between India and Pakistan.⁹⁴

The possibility for a total war over Kashmir, given the nuclear capability of both countries, seems unlikely. However, the strategic importance of Kashmir cannot be underestimated. Additionally, the history of instability between the two countries suggests that conflict could break out overnight and with little warning. Thus, it is unclear to what lengths these countries would go in order to achieve their goals – control of Kashmir and the precious natural resources associated with it.

The rivers flowing from the Kashmir region (ultimately originating in the Tibetan Plateau) into Pakistan are the life-blood of this agriculturally based country. India cut off the flow of this river in 1948, and any new attempt to repeat this action may prove

⁹³ The South Asian, <http://www.the-south-asian.com/March2004/waterforthefuture1.htm> (accessed 8 September 2007).

⁹⁴ Pakistan Tribune, Pak Cannot Get Kashmir by Force, way out is talks: Mushahid: <http://www.paktribune.com/news/index.shtml?176894> (accessed 28 August 2007); Pakistan Tribune, The Riddle of Kashmir: <http://www.paktribune.com/news/index.shtml?168414> (accessed 28 August 2007); BBC News, The Future of Kashmir?: http://news.bbc.co.uk/2/shared/spl/hi/south_asia/03/kashmir_future/html/default.stm (accessed 28 August 2007).

catastrophic. The propensity to go to war over water has been high.⁹⁵ Therefore, it is likely that another attempt to stem the flow of the Indus River by either country would result in conflict – and possibly a nuclear one.⁹⁶

This chapter examines the historical tensions present between India and Pakistan. The ongoing tension over water resources in the Kashmir region and the water dilemma these countries are currently facing may set the stage for unfavorable responses to Chinese attempts to dam the Tibetan Plateau. The chapter examines critical events such as the hasty partition of the Indian subcontinent, the signing of the 1960 Indus Water Treaty, the various terms agreed upon in it, and whether these aspects of can serve as a model for the impending crisis between China, India, and Paksitan.

B. THE ORIGIN OF CONFLICT: THE PARTITION OF INDIA AND PAKISTAN

The prospect that India and Pakistan will go to war over water is rooted in their enduring rivalry, and the military conflicts that they have engaged in.⁹⁷ The rivalry between India and Pakistan stems from the two visions of statehood that arose in the nationalist movement while the Indian subcontinent was under the rule of the British from 1858-1947.⁹⁸ The first vision was developed by the Indian National Congress (INC) who wanted a unified country built around the doctrine of secularism and liberal democracy.⁹⁹ The second vision materialized from a group of Muslim leaders that became distrustful of majority rule and demanded safeguards to protect Muslim interests

⁹⁵ Pacific Institute, <http://worldwater.org/chronology.html>: Environment and Security Water Conflict Chronology (Updated October 2006) (accessed 28 August 2007).

⁹⁶ Transboundary Freshwater Dispute Database, Indus Water Treaty: <http://www.transboundarywaters.orst.edu/projects/casestudies/indus.html> (accessed 26 July 2007).

⁹⁷ T.V. Paul, *The India- Pakistan Conflict: An Enduring Rivalry*, (New York: Cambridge University Press, 2005), 3.

⁹⁸ Ibid., 6.

⁹⁹ Ibid.

within this Hindu-dominated party.¹⁰⁰ As a result, they created the Muslim League in 1906 – the vehicle they used to acquire separate electorates.¹⁰¹ It was these two visions that eventually led to the partition.

Internal tension between these two parties came to a head on August 15, 1947 with the birth of India and Pakistan as independent states.¹⁰² The poor handling of the partition and the violent mass migration of people exacerbated the tensions between the two, leading to decades of conflict. Furthermore, the delineated boundaries set the stage for tensions over water. The major issue was the fact that the headwaters of the Indus were located in India, and the lower basin was in Pakistan.¹⁰³ This placed India at an obvious advantage, with the ability to control the source of water flowing into Pakistan. Adding to the tension was the fact that there was no method to manage the sharing of the water of the Indus system.

The speed with which this decision was made became the focal point of this problem. In other words, the heart of the problem was the feeling that it took more than two centuries to build this empire and ten days to decide to split it. In addition, Sir Cyril Radcliffe's hasty and sloppy creation of the borders – drawn based on religious populations in only 36 days – created the basis for subsequent India-Pakistan tensions.¹⁰⁴ The enduring rivalry between these two countries can therefore be traced back to three main issues: the manner in which the 1947 partition was conducted; the Kashmir question; and the division of assets.

¹⁰⁰ T.V. Paul, *The India- Pakistan Conflict: An Enduring Rivalry*, (New York: Cambridge University Press, 2005), 3.

¹⁰¹ T.V. Paul, *The India- Pakistan Conflict: An Enduring Rivalry*, (New York: Cambridge University Press, 2005), 6.

¹⁰² Ibid., 7.

¹⁰³ PUGWASH, <http://www.pugwash.org/reports/rc/sa/kasmiri-water.htm> (accessed 11 September 2007).

¹⁰⁴ Stanley Wolpert, *Shameful Flight: The Last Years of the British Empire in India*, 157.

C. 1948: THE REASON FOR THE INDUS WATER TREATY

On 12 August 1947, a standstill agreement was proposed as a method to maintain order between the newly born states. The agreement, as incorporated into the Indian Independence Act 1947, called for a status quo until new agreements were set down between the two parties.¹⁰⁵ The problem, however, was that Pakistan immediately accepted the agreement, but India tried to negotiate the terms – ultimately leading to India's rejection.¹⁰⁶ India's rejection of the agreement led Pakistan to distrust of New Delhi's intentions regarding accession.¹⁰⁷ The eventual expiration of this agreement on 1 April 1948 – and the lack of any water sharing agreement – laid the groundwork for India's eventual decision to stem the flow of the Indus River.¹⁰⁸

India's decision to stem the flow of the Indus River followed its realization that no water sharing agreement prevented it. Therefore, on 1 April 1948, India stemmed the flow of the water flowing into the Dipalpur Canal and the main branches of the Upper Bari Daab Canal.¹⁰⁹ India's motivation for stemming the flow is unclear, but there are a number of theories that attempt to explain India's intentions in light of the political situation in 1948. The first theory revolves around legal issues and the fact that the upper riparian state – India – was attempting to establish its sovereign water rights.¹¹⁰ A second, more likely scenario, includes India's desire to pressure Pakistan on the Kashmir issue. In other words, India wanted Pakistan to realize its dependence on India in the hopes of forcing reconciliation.¹¹¹ A third theory is that the action was taken by the

¹⁰⁵ Kashmir Information Network, <http://www.kashmir-information.com/rkkbhatt/bhatt2.html> (accessed 11 September 2007).

¹⁰⁶ Ibid.

¹⁰⁷ Ibid.

¹⁰⁸ Transboundary Freshwater Dispute Database, <http://www.transboundarywaters.orst.edu/projects/casestudies/indus.html> (accessed 11 September 2007).

¹⁰⁹ Ibid.

¹¹⁰ Ibid.

¹¹¹ Ibid.

Indian provincial government of East Punjab. The theory holds that East Punjab decided to stem the flow of the Indus without the approval of the central government.¹¹²

India's successful disruption of the river underscored Pakistan's vulnerability under its larger neighbor. Furthermore, despite India's decision to resume the flow of water into Pakistan a month later, it made it clear that a water sharing agreement was critical to mitigate this obvious problem and preserve Pakistan's economic viability.¹¹³ Therefore, in 1951, the negotiation process for a permanent water sharing agreement began.

D. 1960 INDUS WATER TREATY

The period from 1951-1960 foreshadowed how future negotiations would go between these two nations – except for the fact that this process resulted in an eventual agreement. The decision to enter negotiations came after years of frustration over the lack of a treaty and the fact that the two sides stopped meeting on the issue in 1951.¹¹⁴ The overall process was arduous and frustrating for both parties involved, but the final product was eventually agreed upon by everyone.¹¹⁵ In fact, the treaty became the only agreement that India and Pakistan mutually implemented and adhered to.¹¹⁶

The agreements set forth in the treaty helped maintain peace in South Asia for decades. The key components of the treaty demonstrated that India and Pakistan could work together if the payoff was large enough. The first key part of the treaty involves the division of the Indus River system. This system consists of three eastern rivers – the Sutlej, the Beas and the Ravi, and three western rivers – the Indus, the Jhelum and the Chenab. The treaty gave India exclusive rights to the three eastern rivers up to the point

¹¹² Transboundary Freshwater Dispute Database, <http://www.transboundarywaters.orst.edu/projects/casestudies/indus.html> (accessed 11 September 2007).

¹¹³ Transboundary Freshwater Dispute Database, <http://www.transboundarywaters.orst.edu/projects/casestudies/indus.html> (accessed 11 September 2007).

¹¹⁴ The Henry L. Stimson Center, *The Indus Water Treaty: A History*: <http://www.stimson.org/southasia/?sn=sa20020116301> (accessed 13 September 2007).

¹¹⁵ Ibid.

¹¹⁶ Ibid.

where they enter Pakistan. At the same time, Pakistan was given exclusive rights to the western rivers.¹¹⁷ The second key aspect was the creation of the Indus Commission. This commission was created to adjudicate future disputes over the allocation of water and required annual meetings to discuss any potential problems.¹¹⁸

Despite the treaty's success over the past decades, India and Pakistan have experienced numerous disputes over modifications to the rivers – some of which remain unsettled. The increasing need to maintain a steady flow of water for survival and the recent rise in disagreements over aspects of the treaty raise the question of whether the treaty is still adequate. In addition, the acquisition of nuclear weapons by both India and Pakistan raises the stakes in any serious dispute over these rivers. India and Pakistan must review the treaty and update it where appropriate. Otherwise, the historical success of the treaty may come to an end.

E. NUCLEAR NATIONS

Like China's acquisition of the bomb, India and Pakistan's evolution into regional nuclear powers changed the stakes of total war forever. These declared nuclear states will now have to carefully weigh every decision to wage war. In particular, the perception that India directly threatens the survivability of Pakistan may convince Pakistan to use nuclear weapons as a last resort. In fact, the nuclear doctrines of India and Pakistan paint a scary picture that supports the possibility of nuclear exchange if certain red lines are crossed.

India's nuclear doctrine is much different from Pakistan's. The National Security Advisory Board published India's draft doctrine in 1999. India, unlike Pakistan, does not have any stated nuclear red lines. In fact, it proclaims a retaliatory, no first-use policy

¹¹⁷ The World Bank, Indus Waters Treaty:
<http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/0,,contentMDK:20320047~pagePK:146736~piPK:583444~theSitePK:223547,00.html> (accessed 13 September 2007).

¹¹⁸ The World Bank, Indus Waters Treaty Article VIII:
http://siteresources.worldbank.org/INTSOUTHASIA/Resources/223497-1105737253588/IWT_Article_VIII.pdf (accessed 13 September 2007).

with the goal of nuclear deterrence.¹¹⁹ Therefore, concern arises from the possibility of a nuclear strike from Pakistan. If initiated, the outcome of a nuclear volley would be catastrophic, leaving the countries devastated and regional security in shambles.

Pakistan's nuclear doctrine is shrouded in secrecy. However, there are a number of public statements by senior Pakistani officials that help clarify the picture. Major General Khalid Kidwai, in a late 2000 interview, illuminated critical elements of Pakistan's nuclear doctrine. First and foremost, it is obvious that Pakistan's nuclear doctrine is directed at India. Second, he plainly laid out the red lines that, if crossed, would cause Pakistan to use nuclear weapons against India. These scenarios include the loss of a large part of Pakistan's territory, destruction of a large part of Pakistan's military, economic strangulation, or other attempts to politically destabilize Pakistan.¹²⁰

The looming tensions over water resources highlight the importance of the economic strangulation red line. This red line seems to be the most likely to be crossed; however, it is important to note that this red line reportedly consists of two parts – stemming the water from the Indus River and simultaneously blockading key Pakistani ports. However, it is unknown whether Pakistan will wait until both are accomplished. If it perceives that India is posing a clear and present danger to its survival as a state, it may resort to the use of nuclear weapons. Therefore, it is clear that the problem should be resolved before it spirals out of control, given the many ongoing tensions over aspects of the Indus Water Treaty that challenge the relevance of the treaty.

¹¹⁹ National Security Advisory Board on Nuclear Doctrine, http://www.indianembassy.org/policy/CTBT/nuclear_doctrine_aug_17_1999.html (accessed 11 September 2007).

¹²⁰ Paolo Cotta-Ramusino and Maurizio Martellini, Nuclear Safety, Nuclear Stability, and Nuclear Strategy in Pakistan: A concise report of a visit by Landau Network-Centro Volta (Landau Network, 21 January 2002), 4, <http://lxmi.mi.infn.it/~landnet/Doc/pakistan.pdf> (accessed 11 September 2007); Rafiq Dossani and Henry S. Rowen, *Prospects for Peace in South Asia*, (California: Stanford University Press, 2005), 283.

F. CONTEMPORARY CHALLENGES: IS THE TREATY STILL RELEVANT?

The 1960 Indus Water Treaty is a satisfactory agreement that requires modifications to limit the potential for future conflict over water sharing – especially in view of the potential for a nuclear exchange. Despite its success, four major issues feed these tensions. They include the controversial decision to approve the construction of the Baglihar Dam on the Chenab River, the unsettled Kishenganga Dam project (sometimes referred too as the Wullar or Wular Barrage) that affects the Jhelum River (Figure 9), the potential construction of the Iran-Pakistan-India (I-P-I) oil pipeline, and China's proposed plan to tap into water sources on the Tibetan Plateau.¹²¹ The main point of contention with regard to these issues is that, according to the 1960 Indus Water Treaty, Pakistan has rights to the Chenab and Jhelum rivers. Therefore, it is clear why tensions are high and Pakistan is making India's life miserable with regard to the completion of these river projects. Furthermore, the I-P-I pipeline could provide Pakistan with an unacceptable political lever, in India's eyes, that could be used when needed.



Figure 9. The Wullar Barrage Project.

¹²¹ Reuters, <http://in.reuters.com/article/topNews/idINIndia-29268120070831?feedType=RSS> (accessed 12 September 2007); World Bank, Indus Water Treaty: <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/0,,contentMDK:20320047~pagePK:146736~piPK:583444~theSitePK:223547,00.html> (accessed 13 September 2007).

The dam projects raise serious concerns for Pakistan. Its main concern is the uncertainty of India's intentions and whether the water will be used for something other than power generation – similar to its reasons for stemming the flow of essential rivers in 1948. Pakistan argues that India is trying to divert the river water, ultimately reducing the flow of the essential resource into Pakistan's highly agrarian economy.¹²² If these projects are approved, it may place India in a position to control the flow of these rivers or use the dams in an offensive manner by flooding key Pakistani terrain. Additionally, it also reinforces Pakistan's feelings of vulnerability to its powerful neighbor – a position that could encourage the use of nuclear weapons in a desperate situation.

The I-P-I pipeline could provide Pakistan with a significant lever over India – politically and militarily (see Figure 10). India's dependence on oil and gas increases along with its growing population. Therefore, Pakistan's ability to use this pipeline is a major concern for India. If completed, Pakistan could use its presence as a means to acquire financial gains through taxes and as a counter to any future threat by India to cut off the flow of any rivers. The ability to use the I-P-I pipeline as a lever does provide Pakistan with an adequate counter to India's ability to control the rivers. However, it does not alleviate the tensions between these countries.

¹²² Jane's, Water fight - Baglihar Dam divides India and Pakistan:
http://www8.janes.com/Search/documentView.do?docId=/content1/janesdata/mags/jir/history/jir2007/jir10090.htm@current&pageSelected=allJanes&keyword=Indus%20Water%20Treaty&backPath=http://search.janes.com/Search&Prod_Name=JIR& (accessed 26 July 2007).



Figure 10. The I-P-I Pipeline.

Finally, the 1960 Water Treaty does not include India and Pakistan's neighbors. Therefore, it highlights the lack of water sharing agreements between these countries. As previously discussed, these major rivers originate in Chinese territory. For that reason, it is critical that the existing water treaty include China and the resources of the Tibetan Plateau, or the three conclude a new treaty. The development of such a treaty may not totally eliminate the possibility of war over these resources. However, it will certainly ensure that India and Pakistan have a voice in future Chinese projects focused on this region.

G. CONCLUSION

The preponderance of evidence indicates that the world's water resources are diminishing at a rapid rate. Additionally, the requirement for more water, due to increased energy needs and population growth, is becoming the source of increased competition between countries and the foundation for conflict. China, India and Pakistan are examples of where water scarcity is becoming a major concern, and a lack of action could result in catastrophic results.

India and Pakistan's enduring rivalry provides the groundwork for an unpredictable relationship between these regional powers. The partition instilled a mutual distrust that persists today. Exacerbated by the growing water crisis, the potential for conflict between these countries is high. Furthermore, the possession of nuclear weapons by these countries raises the stakes of the game.

The potential for all-out nuclear exchange is low. However, the potential in light of serious disputes over water resources raises serious concerns for parties interested in maintaining regional security. So, it is important to ensure that water issues be considered in future diplomatic efforts to ensure regional stability. In other words, interested external powers should consider a proactive approach instead of a reactive one. The propensity between these countries for conflict makes a reactive approach undesirable. In the event of a nuclear exchange, China, India and Pakistan would be decimated in minutes and the long-term effects on regional security would last for decades to follow.

The stability of the South Asian region is important for a number of reasons. These countries have a history of tense relations that tend to lead to conflict. Therefore, in order to engage these countries effectively, it may be important to address them separately at first – similar to China's current approach to regional relations.¹²³ As South Asia approaches a water crisis, the 1960 Indus Water Treaty is a good starting point – as it appears to pose the most relevant challenge as far as large-scale engagement is concerned. If China and South Asia cannot settle potential disputes over water, it may be up to a fourth party, such as the United States, to motivate change.

India and Pakistan share a similar fate with regard to China. They also are reaching a level of water scarcity deemed to be unacceptable by international standards. Additionally, India and Pakistan are dependant on water sources that originate from the Tibetan Plateau. Finally, these countries both possess nuclear weapons. Unlike China, however, India and Pakistan are not proposing plans to unilaterally exploit the water

¹²³ BG Feroz Khan, Naval Postgraduate School Department of National Security Studies, NS4668 In class lecture.

resources of the Tibetan Plateau. Despite historical tension over water resources in the Kashmir region, India and Pakistan proved that agreements over water resources can be developed. Therefore, India and Pakistan will likely be willing to negotiate a plan with China over the resources of the Tibetan Plateau if requested to do so. However, if China turns rhetoric into action without attempting to produce an interstate agreement over these resources, India and Pakistan will be left with no other choice but to wage war over the water resources of the Tibetan Plateau.

The final chapter will serve as a method to revisit the major issues discussed in the thesis. It will also highlight the lack of any standard forum for these countries to conduct conflict resolution regarding these issues. Finally, it will provide some recommendations and final analysis regarding the water crisis and hopefully serve as a means to draw attention to this problem before it is too late.

IV. RECOMMENDATIONS AND CONCLUSION

A. SUMMARIZING THE ISSUES

This thesis has identified facts and figures indicating that the water supply in China, India, and Pakistan is diminishing at an alarming rate. It underlines the fact that the potential for conflict over water in Asia remains on the backburner while the international community focuses all its efforts on oil resources and climate change. The decision to continue to ignore this problem may result in catastrophic consequences leading to regional instability and possibly armed conflict. Therefore, it is imperative to focus attention on this problem before it spirals out of control.

China's current efforts to remedy its internal water crisis prove they are aware of the problem. In fact, the statistics show that China will be unable to sustain its population with fresh water by 2025. As a result, it is initiating numerous water projects designed to solve its crisis. However, China continues to focus its efforts on the Tibetan Plateau's rich water resources – an area that supplies almost half the world's population with fresh water and lacking any water sharing agreements between the sharing countries. As a result, China's efforts, if left unsupervised, could affect major water lifelines that feed India and Pakistan.

India and Pakistan's history of tension indicate that regional conflict and destabilization is possible barring effective diplomatic actions or agreements – evident with successes due to the 1960 Indus Water Treaty. However, China and South Asia have a checkered past. They have all participated in some sort of regional conflict since the partition of India and tensions remain from these encounters. Therefore, the potential for violence to arise over these issues is possible.¹²⁴ Additionally, these countries, specifically Pakistan, have identified thresholds that recognize its intolerance toward any effort to impact the unimpeded access to natural resources.

¹²⁴ Secretary Condoleezza Rice, "U.S. Policy Toward Asia," 18 June 2008, <http://www.state.gov/secretary/rm/2008/06/106034.htm> (accessed 25 July 2008).

The potential for interstate conflict over the water resources of the Tibetan Plateau are high if actions to alleviate the dwindling water resources of China, India, and Pakistan are not taken. As identified in figure four of the introduction, these countries all have characteristics that lay the ground work for potential conflict over water resources. Currently, there are no international efforts to assist these countries in the development of an agreement to share the resources of the Tibetan Plateau. If allowed to deteriorate at this pace, China, India, and Pakistan will be forced to exploit any available water resources in order to ensure the survival of their populations. As is true in human nature, the will to survive trumps all other instincts. For that reason, it is reasonable to assume that China, India, and Pakistan will do what is necessary to ensure its survivability.

Senator Gary Hart stated that “the key to dealing with these types of international crises is to address them before they become a problem.”¹²⁵ Therefore, it is critical to foster cooperation before this crisis reaches a level of competition. The result of competition will be interstate war – a result only likely if China decides to execute proposed plans to exploit the Tibetan Plateau without interstate agreements. The result of cooperation will be the creation of interstate agreements over these water resources. The latter result will not only benefit U.S. regional affairs, but it will likely assist in ensuring these resources are utilized in a fair and effective manner – ultimately maintaining regional stability.

B. ASIAN FOREIGN POLICY: WHAT DOES THE U.S. HAVE TO LOSE?

The rise of Asian countries is a topic of numerous policy debates currently taking place in Washington. In fact, during a recent 2008 press conference, Secretary Condoleezza Rice stated that “the rise of Asia is a profound geopolitical trend that is reshaping our world today.”¹²⁶ The overall mission of the Department of State is very clear with regard to international affairs. It is committed to “advance freedom for the benefit of the American people and the international community by helping to build and

¹²⁵ Senator Gary Hart, Phone Interview, 24 July 2008.

¹²⁶ Secretary Condoleezza Rice, “U.S. Policy Toward Asia,” 18 June 2008, <http://www.state.gov/secretary/rm/2008/06/106034.htm> (accessed 25 July 2008).

sustain a more democratic, secure, and prosperous world composed of well-governed states that respond to the needs of their people, reduce widespread poverty, and act responsibly within the international system.”¹²⁷ This statement highlights a key aspect toward U.S. policy that includes the desire to maintain peace and prosperity. It is clear that instability in Asia could wreak havoc on U.S. goals and desires to continue effective international affairs in this region.

Currently, the U.S. is heavily engaged in Asia in order to achieve its stated foreign affairs goals. More specifically, the U.S. is more sighted on solving two major regional issues: 1. the motivation behind China’s military build up; and 2. the denuclearization of North Korea.¹²⁸ With that in mind, it is safe to assume that secondary issues such as regional water scarcity issues are being overlooked. It is in the best interests of the U.S. to refocus their efforts on solving this crisis. If left unattended, it may spiral into an unfixable problem.

The research clearly indicates that scarce water supplies are a major concern for China, India, and Pakistan. As a result, the continued depletion of this commodity will likely be a significant flash point for regional destabilization if ignored. The U.S. is attempting to address world wide climate change issues; however, it may not be placing enough emphasis on isolated problem areas such as water. The climate change dilemma is clearly an important issue. However, the topic of water scarcity is also as important and arguably inseparable from the climate change issue.¹²⁹ Therefore, it should be addressed at the same level in order to ensure the problem is dealt with in a timely manner.

U.S. efforts to maintain peace and stability in the Asian region are clear. The U.S. has been heavily invested in the Asian region for decades. It has fostered great alliances with Japan and South Korea. Additionally, it is making progress with other Asian

¹²⁷ Secretary Condoleezza Rice, “Strategic Plan: Fiscal Years 2007-2012,” 4, <http://www.state.gov/documents/organization/86291.pdf> (accessed 26 July 2008).

¹²⁸ Secretary Condoleezza Rice, “U.S. Policy Toward Asia,” 18 June 2008.

¹²⁹ Senator Gary Hart, Phone Interview, July 24, 2008.

countries such as China.¹³⁰ Therefore, it is clear that the stakes are high. The U.S. has a lot to lose if regional stability falls apart. So, it is necessary to examine its ability to handle the issue. If nothing exists to handle the impending water crisis, it is imperative to create an institution charged with solving the problem to ensure the U.S. can continue to effectively conduct foreign affairs in Asia.

C. PRESERVING NATURAL RESOURCES: ARE WE SET UP TO SUCCEED?

The international community is not designed to handle conflict resolution surrounding issues of natural resources and climate change. According to Secretary of State Condoleezza Rice, “there is no established forum in Northeast Asia for the major powers to discuss their security concerns together.”¹³¹ Therefore, it is clear that the international community, possibly spearheaded by the U.S., needs to create a process to address these concerns. There are numerous countries that successfully developed agreements over shared resources. However, some of these agreements were developed under duress and are out dated – the 1960 Indus Water treaty being a prime example. Additionally, there are countries like China that share resources with numerous neighbors that lack any sort of guidance with regard to these resources. This lack of consensus serves as a major source of conflict if desires are turned into actions.

The international community is filled with agencies focused on environmental protection. In fact, China, India, and Pakistan all have their own version of the Environmental Protection Agency. However, these agencies are not charged with the task of conflict management. For example, the U.S. Environmental Protection Agency is responsible for “protecting human health and the environment.”¹³² These agencies are interested in solving the climate change dilemma and addressing environmental concerns not resolving possible conflicts over shared resources. They are a step in the right direction in order to address one aspect of this dilemma, however, the solution likely rests

¹³⁰ Secretary Condoleezza Rice, “U.S. Policy Toward Asia,” 18 June 2008.

¹³¹ Secretary Condoleezza Rice, “U.S. Policy Toward Asia,” 18 June 2008.

¹³² U.S. Environmental Protection Agency, “Our Mission,” <http://www.epa.gov/epahome/aboutepa.htm> (accessed 26 July 2008).

in creating an institution capable of filling the void identified by Secretary Rice's comment regarding the lack of a Northeast Asian forum capable of dealing with conflict resolution.

D. FINAL ANALYSIS

The potential for conflict to arise between China, India, and Pakistan over these shared water resources is possible if the problem continues to be overlooked. Although resorting to armed conflict is not the only possible response, it is the most serious with regard to maintain regional stability. With that in mind, it is critical to ensure steps are taken to address this issue before these countries need to decide whether military or diplomatic measures should be taken.

Asia is a volatile region currently experiencing a relatively high degree of peace, prosperity and stability. However, as history indicates, the ball could drop overnight. It is clear that Asian countries will resort to armed conflict if provoked, and it is in the best interest of the U.S. to prevent this from taking place. Therefore, it is critical to begin looking at possible solutions to the problem which include drafting a water sharing agreement between China, India, and Pakistan. Additionally, it would be prudent to develop a method for these countries to resolve conflicts on the international stage. It would not only allow them a chance to diplomatically resolve points of tension, but it would allow the U.S. to weigh in, if required.

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF REFERENCES

- Aiyar, Pallayi, Frontline, "Water woes,"
<http://www.flonnet.com/fl2412/stories/20070629000105900.htm> (accessed 21 November 2007).
- Arpi, Claude, "Diverting the Brahmaputra: Declaration of war?",
<http://www.rediff.com/news/2003/oct/27spec.htm> (accessed 2 September 2008).
- BBC News, The future of Kashmir?:
http://news.bbc.co.uk/2/shared/spl/hi/south_asia/03/kashmir_future/html/default.stm (accessed 28 August 2007).
- Bagchi, Indrani, "China's river plan worries India," 23 October 2006,
http://timesofindia.indiatimes.com/India/Chinas_river_plan_worries_India/articleshow/msid-2229977,curpg-1.cms (accessed 15 May 2008).
- Bajpaee, Chietigj, "Asia's coming water wars," Power and Internet News Report, (2006),
http://www.pinr.com/report.php?ac=view_report&report_id=545&language_id=1 (accessed 25 October 2007).
- Bangladesh News, "China plans to divert Brahmaputra waters,"
<http://www.bangladeshnews.com.bd/2007/05/08/china-plans-to-divert-brahmaputra-waters/> (accessed 26 November 2007).
- Brown, Lester, R., "Worsening water shortages threaten China's food security,"
<http://www.earth-policy.org/Updates/Update1.htm> (accessed 21 November 2007).
- Central Intelligence Agency: *The World Fact Book*, China,
<https://www.cia.gov/library/publications/the-world-factbook/geos/ch.html> (accessed 21 November 2007).
- Chellaney, Brahma, "China aims for bigger share of South Asia's water lifeline," Yale Global Online, <http://yaleglobal.yale.edu/display.article?id=9377> (accessed 2 September 2008).
- Chellaney, Brahma, "Averting water wars in Asia the next struggle," 27 June 2007:
http://www.redorbit.com/news/science/982359/averting_water_wars_in_asia_the_next_struggle/index.html?source=r_science (accessed 27 June 2007).
- China Daily, "One-third of China's dams unsafe,"
http://www.chinadaily.com.cn/china/2006-08/08/content_659827.htm (accessed 21 November 2007).

Cleaner production in China, Rivers and Lakes identified for environmental protection,
http://www.chinacp.com/eng/cppolicystrategy/cp_rivers_lakes.html#ChangJiang
(accessed 14 November 2007).

Comstock, Paul, California literary review Fred Pearce interview, April 3, 2007:
<http://calitreview.com/2007/04/03/an-interview-with-fred-pearce> (accessed 1
November 2007).

Cotta-Ramusino, Paolo and Maurizio Martellini, *Nuclear safety, nuclear stability, and
nuclear strategy in Pakistan: a concise report of a visit by Landau Network-
Centro Volta* (Landau Network, 21 January 2002),
<http://lxmi.mi.infn.it/~landnet/Doc/pakistan.pdf> (accessed 11 September 2007).

DeLisle, Jacques, "China rising: assessing China's economic and military power,"
<http://www.fpri.org/enotes/200710.delisle.chinarising.html> (accessed 26
November 2007).

Dossani, Rafiq and Henry S. Rowen, *Prospects for peace in South Asia* (California:
Stanford University Press, 2005).

Dupont, Alan. *East Asia imperiled: transnational challenges to security* (New York:
Cambridge University Press, 2001).

Economy, Elizabeth, C., "China's environmental challenge: political, social and
economic implications,"
http://www.cfr.org/publication/5573/chinas_environmental_challenge.html
(accessed 21 November 2007).

Economy, Elizabeth C., *The river runs black: the environmental challenge to China's
future* (Ithaca, NY: Cornell University Press, 2004).

Environment and Development Desk, Department of Information and International
Relations, Central Tibetan Administration, Tibet: A Human Development and
Environment Report, 2007, Chapter Five, 122
<http://www.tibet.net/en/diir/pubs/edi/tib2007/chap-5.pdf> (accessed 2 September
2008).

Hart, Gary, Phone Interview, 24 July 2008.

International Rivers, "Three Gorges Dam,"
<http://internationalrivers.org/en/image/tid/111?page=1> (accessed 13 May 2008).

International Water Management Institute,
[http://www.iwmi.cgiar.org/assessment/files_new/newsroom/FinancialTimes_Wor
ld_2006.pdf](http://www.iwmi.cgiar.org/assessment/files_new/newsroom/FinancialTimes_World_2006.pdf) (accessed 6 September 2007).

- Jane's, Water fight - Baglihar Dam divides India and Pakistan:
http://www8.janes.com/Search/documentView.do?docId=/content1/janesdata/mags/jir/history/jir2007/jir10090.htm@current&pageSelected=allJanes&keyword=Indus%20Water%20Treaty&backPath=http://search.janes.com/Search&Prod_Name=JIR (accessed 26 July 2007).
- Kashmir Information Network, <http://www.kashmir-information.com/rkkbhatt/bhatt2.html> (accessed 11 September 2007).
- Khan, Feroz, Naval Postgraduate School Department of National Security Studies, NS4668 In Class Lecture.
- Koeller, David, W., "Stele of the vultures: war between Umma and Lagash," <http://www.thenagain.info/Classes/Sources/UmmaLagash.html> (accessed 13 May 2008).
- Law of the PRC, Water Law 1988, <http://www.asianlii.org/cn/legis/cen/laws/wl198895/> (accessed 21 November 2007).
- Lynn, Madeleine, "Ethics be dammed? China's water projects," 10 January 2007, http://www.cceia.org/resources/ethics_online/0005.html (accessed 21 November 2007).
- McAlister, John, Dr., "China's water crisis," 22 March 2005, <http://www.cbiz.cn/download/aquabio.pdf> (accessed 14 November 2007).
- McCormack, Gavan, "Water margins: competing paradigms in China," *Critical Asian Studies*, 33:1 (2001).
- Michel, Aloys Arthur, *The Indus River: a study of the effects of partition* (New Haven and London: Yale University Press, 1967).
- National Security Advisory Board on Nuclear Doctrine, http://www.indianembassy.org/policy/CTBT/nuclear_doctrine_aug_17_1999.html (accessed 11 September 2007).
- OECD, "Water and violent conflict": <http://www.globalpolicy.org/security/natres/water/2005/052605waterconflict.pdf> (accessed 3 October 2007).
- Pacific Institute, <http://worldwater.org/chronology.html>: Environment and security water conflict chronology (Updated October 2006) (accessed 28 August 2007).

- Pakistan Tribune, Pak cannot get Kashmir by force, way out is talks: Mushahid:
<http://www.paktribune.com/news/index.shtml?176894> (accessed 28 August 2007).
- Pakistan Tribune, The riddle of Kashmir:
<http://www.paktribune.com/news/index.shtml?168414> (accessed 28 August 2007).
- Paul, T.V. ed. *The India- Pakistan conflict: an enduring rivalry* (New York: Cambridge University Press, 2005).
- People's Daily Online, "China's agricultural exports to grow 10 percent in 2004,"
http://english.peopledaily.com.cn/200412/29/eng20041229_169111.html
 (accessed 21 November 2007).
- People's Daily Online, "Inefficiency aggravates China's water shortage,"
http://english.people.com.cn/200611/22/eng20061122_324042.html (accessed 21 November 2007).
- Postel, Sandra, L. and Aaron T. Wolf, Global Policy Forum, "Dehydrating conflict,"
 September 18, 2001:
<http://www.globalpolicy.org/security/natres/water/2001/1001fpol.htm> (accessed 1 November 2007).
- PUGWASH, <http://www.pugwash.org/reports/rc/sa/kasmiri-water.htm> (accessed 11 September 2007).
- Qinye, Yang and Zheng Du, *Tibetan Geography* (Beijing: China Intercontinental Press, 2004).
- Reuters, "China water officials denies plan to dam Indian river," 21 November 2006
<http://today.reuters.com/News/CrisesArticle.aspx?storyId=PEK165504> (accessed 15 May 2008).
- Reuters India, "India, Pakistan fail to settle dam dispute:"
<http://in.reuters.com/article/topNews/idINIndia-29268120070831?feedType=RSS>
 (accessed 12 September 2007).
- Rice, Condoleezza, "Strategic plan: fiscal years 2007-2012," 4,
<http://www.state.gov/documents/organization/86291.pdf> (accessed 26 July 2008).
- Rice, Condoleezza, "U.S. policy toward Asia," 18 June 2008,
<http://www.state.gov/secretary/rm/2008/06/106034.htm> (accessed 25 July 2008).

- Schneider, Keith and C. T. Pope, "China, Tibet, and the strategic power of water," <http://www.circleofblue.org/waternews/world/china-tibet-and-the-strategic-power-of-water/> (accessed 2 September 2008).
- Shiva, Vandana, *Water wars: privatization, pollution and profit* (Cambridge, MA: South End Press, 2002).
- Swedish Water House, "Water and conflict: a brief review of the academic literature and other sources," October 2004:
http://www.swedishwaterhouse.se/swh/resources/20050310144027Water_and_Local_Conflict.pdf (accessed 1 November 2007).
- The Henry L. Stimson Center, The Indus Water Treaty: a history:
<http://www.stimson.org/southasia/?sn=sa20020116301> (accessed 13 September 2007).
- The Report of the World Commission on Dams, "Dams and development: a new framework for decision-making," 2000,
<http://www.dams.org/docs/report/wcdreport.pdf> (accessed 21 November 2007).
- The South Asian, <http://www.the-south-asian.com/March2004/waterforthefuture1.htm> (accessed 8 September 2007).
- The World Bank, Indus Waters Treaty:
<http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/0,,contentMDK:20320047~pagePK:146736~piPK:583444~theSitePK:223547,0.html> (accessed 13 September 2007).
- The World Bank, Indus Waters Treaty article VIII:
http://siteresources.worldbank.org/INTSOUTHASIA/Resources/223497-1105737253588/IWT_Article_VIII.pdf (accessed 13 September 2007).
- Three Gorges Bulletin, Progress of the Three Gorges project,
<http://www.zhb.gov.cn/english/quality/3Gorges/index.htm> (accessed 14 November 2007).
- Transboundary Freshwater Dispute Database, Indus Water Treaty:
<http://www.transboundarywaters.orst.edu/projects/casestudies/indus.html> (accessed 26 July 2007).
- Tsering, Tashi, Tibetan Bulletin Online, "Policy implications of current dam projects on Driчу – the Upper Yangtze River,"
<http://www.tibet.net/en/tibbul/2005/0102/environment1.html> (accessed 14 November 2007).

- U.S. Environmental Protection Agency, "Our mission,"
<http://www.epa.gov/epahome/aboutepa.htm> (accessed 26 July 2008).
- Water Conflict Chronology, <http://worldwater.org/conflictchronology.pdf> (accessed 3 October 2007).
- Water-Technology.net, "South-to-North water diversion project, China,"
http://www.water-technology.net/projects/south_north/index.html#south_north1
(accessed 15 May 2008).
- Waternunc, <http://www.waternunc.com/gb/pws2025.htm> (accessed 8 September 2007).
- Wolf, Jr., Charles, K.C. Yeh, Benjamin Zycher, Nicholas Eberstadt, Sung-Ho Lee, *Fault lines in China's economic terrain*, (Santa Monica, CA: Rand, 2003).
- Wolpert, Stanley, *Shameful flight: the last years of the British Empire in India* (Oxford and New York: Oxford University Press, 2006).
- World Water Conservation, "China's water,"
<http://worldwaterconservation.com/chinawater1.html> (accessed 21 November 2007).
- WWF, "Dam facts and figures,"
http://www.panda.org/about_wwf/what_we_do/freshwater/our_solutions/policy_practice/dams_initiative/quick_facts/index.cfm (accessed 21 November 2007).
- WWF Nepal Program, "An overview of glaciers, glacier retreat, and subsequent impacts in Nepal, India and China," March 2005,
<http://assets.panda.org/downloads/himalayaglacierson2005.pdf> (accessed 14 November 2007).
- Xinbo, Wang, *The water revolution*, <http://www.sdnetwork.net/files/pdf/chapter6-xinbo.pdf> (accessed 21 November 2007).
- Yardley, Jim, New York Times, "Chinese dam projects criticized for their human costs,"
http://www.nytimes.com/2007/11/19/world/asia/19dam.html?pagewanted=1&_r=1&ei=5089&en=e41f237d379a6b10&ex=1353214800&partner=rssyahoo&emc=rss (accessed 19 November 2007).
- Zhan, Yan, World Watch Institute, "China's groundwater future increasingly murky,"
<http://www.worldwatch.org/node/4753>.
- Zissis, Carin, "China's environmental crisis," 9 February 2007
http://www.cfr.org/publication/12608/chinas_environmental_crisis.html#10
(accessed 13 May 2008).

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center
Fort Belvoir, Virginia
2. Dudley Knox Library
Naval Postgraduate School
Monterey, California